



# **DigiView User's Guide**

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# DigiView User's Guide

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# Table of Contents

Foreword	0
<b>Part I Getting Started</b>	<b>2</b>
1 Installing the USB Drivers .....	3
2 USB Connection .....	4
3 Menus, Tool Bars and Mouse basics .....	4
Top Tool Bar .....	7
Bottom Tool Bar .....	8
4 Window Arrangement .....	9
Docking Windows .....	10
Tabbing Windows .....	12
Tab Window Options.....	14
Alignment Management .....	18
<b>Part II Project Operations</b>	<b>20</b>
1 Project Selections .....	21
2 Creating a New Project .....	23
3 Converting Projects .....	25
<b>Part III Configuration</b>	<b>29</b>
1 Connecting the Data Lines .....	29
2 Defining Signals and Triggers .....	31
<b>Signals</b> .....	<b>31</b>
Signal Editors.....	33
Boolean .....	35
Bus .....	37
CAN BUS .....	39
Asynchronous .....	42
I2C .....	45
I2S .....	49
State .....	51
Synchronous .....	54
SPI Signal Properties.....	57
Plotting Signal Data.....	61
<b>Triggers</b> .....	<b>64</b>
Trigger Configuration.....	65
Sequencer.....	69
Trigger Match Types.....	70
Pattern Match .....	72
Edge Match .....	73
Stable Match .....	75
Equal Match .....	76
Not Equal Match.....	78
Greater Than Match.....	80
Greater Than or Equal Match.....	82
Less Than Match.....	84

Less Than or Equal Match.....	86
<b>3 Analyzer Options .....</b>	<b>88</b>
Buffer Settings .....	88
Voltage Threshold .....	90
<b>4 Acquisition Options .....</b>	<b>97</b>
<b>5 Color Themes .....</b>	<b>100</b>
Theme Examples .....	103
Custom Theme .....	109
<b>6 Using the Color Selector .....</b>	<b>112</b>
<b>7 Environment Settings .....</b>	<b>113</b>
<b>Part IV Capturing Data .....</b>	<b>117</b>
<b>1 Hardware Status .....</b>	<b>119</b>
<b>2 Capture History .....</b>	<b>120</b>
<b>3 Status Window .....</b>	<b>122</b>
<b>4 Capture Troubleshooting .....</b>	<b>123</b>
<b>Part V Navigating and Analyzing the Data .....</b>	<b>127</b>
<b>1 Waveform Views .....</b>	<b>127</b>
Toolbar Buttons .....	130
Mouse Functions .....	131
Snap and Value Columns .....	135
Bird's-Eye Scrollbar .....	138
Marquee Zoom .....	139
Using Markers .....	139
Key Functions .....	148
<b>2 Measurements .....</b>	<b>150</b>
Instant Measurements .....	150
Quick Measurements .....	153
Dynamic Measurement Window .....	157
Marker Time/Delta .....	161
<b>3 Table View Windows .....</b>	<b>163</b>
<b>4 List View Windows .....</b>	<b>166</b>
<b>5 Using Link Groups .....</b>	<b>171</b>
<b>6 Searches .....</b>	<b>172</b>
Define Searches .....	172
Search Types.....	173
Sequential Searches.....	173
Pattern Searches.....	178
Searching .....	178
Search Manager Window .....	179
Auto Search Windows .....	180
Capture History Searching .....	182
<b>Part VI Exporting .....</b>	<b>186</b>
<b>1 Exporting All Signal Data .....</b>	<b>187</b>
<b>2 Exporting from List Windows .....</b>	<b>189</b>

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3 Exporting from Table Windows .....	191
<b>Part VII Printing and Saving Images</b>	<b>194</b>
<b>Part VIII Appendicies</b>	<b>201</b>
1 DigiView Compression .....	201
2 DigiView Hardware Specifications .....	204
<b>Index</b>	<b>207</b>

# Getting Started

**Part**



# 1 Getting Started



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**Thank You for choosing TechTools for your development needs.**

DigiView is a highly productive, thoroughly integrated tool with many in-depth features when compared to other PC based Logic Analyzers. Each feature is deeply integrated and complete with options that might not be immediately apparent. To benefit from all of DigiView's features we suggest taking the time to briefly review our User's Guide. Some portions will cover obvious features or those you may already be aware of however, you may find one of those 'must have' features once you review this guide and start using the software.

- Installing the Software
- [Installing the USB Drivers](#) <sup>3</sup>
- [USB Connection](#) <sup>4</sup>

Launching the software can be done by any of the standard methods (Start Menu, Desktop Shortcut, selecting "Open" on a project file, etc). But the following sections provide much needed information on what to do when the software launches and some basic usage that will help you get the most benefit from our software such as using the Left or Right mouse buttons on many of our buttons to activate opposite or symmetrical functions (Dual Function Buttons).

## **Some 'Must See' Basics**

The Section "Menus, Tool Bars and Mouse Basics" covers some fundamental basics used throughout the program such as using both Left and Right mouse clicks on many of our dual function buttons.

**See:** [Menus, Tool Bars and Mouse Basics](#) <sup>4</sup>

## **Some Layout and Window Placement**

DigiView's software has a very customizable user interface to adapt to your needs. Docking, Tabbing and aligning the various Feature Windows on the screen is covered in the Window Arrangement section.

**See:** [Window Arrangement](#) <sup>9</sup>

### Getting a Project Started

After installing the software and connecting the DigiView hardware we suggest opening some of the included project examples to experiment with, even if your Device Under Test is configured differently than the example. This will help you get familiar with the flexibility of DigiView's software.

The section "Project Selections" covers the initial startup screen and selecting one of our example projects (that come complete with captured data).

See: [Project Selections](#) 

## 1.1 Installing the USB Drivers

We have 2 versions of the installer; the Current Release and a Legacy Release. The CURRENT RELEASE supports 32 and 64 bit versions of XP, Vista, Win7 and Win8.1. The Legacy release supports Win98se, Win98Me and Win2K. It also provides support for Model DV1-100 (discontinued) but does not support our newer models. The Legacy version (5.1) is available from our web site but is no longer updated.

Our DigiView software and drivers are Authenticode signed.

**If Windows reports that the publisher is unknown or that the software is not signed, then the files are corrupt, infected or otherwise modified. Cancel the installation, delete the file and download an authentic copy from our web site: <http://www.tech-tools.com>.** The Authenticode signature is timestamped to ensure the signature remains valid even if our Certificate eventually expires. In other words, it will not 'time-out.' You will be able to re-install the software and drivers, even if we go out of business or fail to renew our certificate.

**Run the application installer BEFORE plugging in the hardware. It installs the application software and pre-installs the drivers. You can accept the defaults or modify to suite your needs.**

Depending on your Windows version and system settings, Windows might ask your permission to install the application and again to install the drivers.

When the installation is complete, plug the DigiView into a high-speed USB port (preferably to a port directly connected to the motherboard at the rear of the computer or a port anywhere on the computer case that utilizes a high quality cable internally). Current versions of Windows will see the hardware and will find the pre-installed drivers automatically. Older versions will present a **Add New Hardware Wizard**.

Answer as follows for the smoothest installation:

**Win 8.1:**

- No action needed.

**Win 7:**

- No action needed.

**Vista:**

- No action needed.

**XP:**

- Search Windows Update? : "No,not at this time" (just saves time)
- "Install the software automatically" (the default)

If this is the first driver on your system to use the latest driver framework, Windows will take additional steps to update the system. Newer frameworks coexist with older frameworks, ensuring that existing drivers continue to operate as before. Unfortunately, this takes Windows several minutes and requires a system reboot to complete. Note that this update occurs (if required) when you plug in the DigiView – not during our application install.

## 1.2 USB Connection

**Power:**

- DV3100, DV3109, DV3200, DV3209, DV3409:

Plug DigiView into a POWERED HUB (one with its own power supply) or directly into a USB port on your PC. You can not use a bus-powered hub; it does not have enough power to operate DigiView.

- DV3400, DV3500:

Powered by an external power supply, so USB power is of no concern.

**Speed:**

- DV3100, DV3109, DV3200, DV3209, DV3400, DV3409, DV3500:

You will experience better performance on a 2.0 port, but a 1.1 port is sufficient.

**Connection Quality:**

Preferably, use a high-speed USB port located directly on the motherboard at the rear of the computer or a port anywhere on the computer case that utilizes a high quality cable internally. If you use a different USB cable than the one provided with the unit, it should match the full rated speed of the USB connection to prevent communication errors or loss of data.

## 1.3 Menus, Tool Bars and Mouse basics

This section covers some fundamental basics used throughout the program. Knowing this information will be a tremendous help if you have never used our software or are updating to the latest version.

**Menus**

Due to having numerous menus in the application, all menus have a Title Bar for identification. Clicking anywhere in the title of a menu will dismiss it.



**The Main Menu** - Our application menu has changed to a single-button vertical menu located in the upper-left corner of the main application window's top tool bar.



**Local Menus** - Each feature window has its own local menu on its tool bar. Some windows will have an additional menu accessible by a Right-Click in the body of the window or other objects that will display a menu when clicked.

Local Menus also have a common "Window" menu item with general options for the window such as Tool Bar visibility and placement, Font properties, undocking and so forth. Additional menu items on the local menu are options or functions specific to the window's content.

## Tool Bars

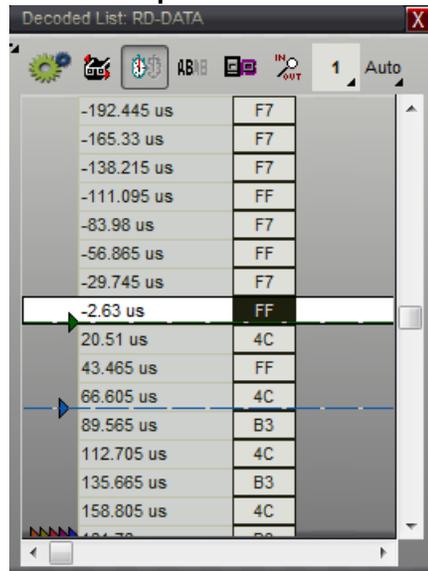
The main application has two tool bars. One at the top and bottom of the application window.

see [Top Tool Bar](#)<sup>[7]</sup>, [Bottom Tool Bar](#)<sup>[8]</sup>

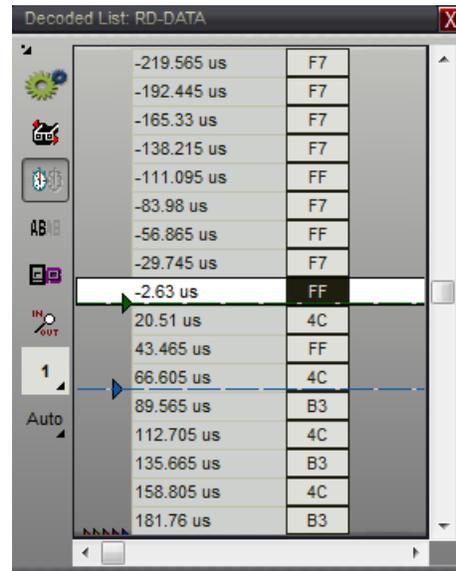
**Local Window Tool Bars** - All docking windows have a configurable tool bar that auto-positions itself at the top or left side of the window depending on the height to width ratio and where the window is placed. This feature can be disabled and tool bar placement can be chosen by using the local menu's Window option.

These tool bars can also be hidden by double clicking on any area not occupied by a button or by using the small triangle in the upper-left corner. Repeating the process will re-open the tool bar.

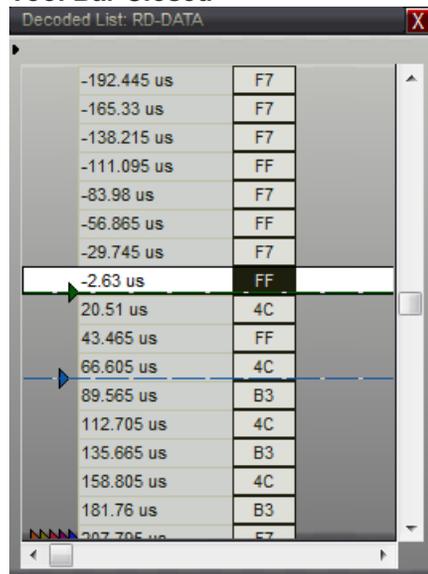
Tool Bar Top



Tool Bar Left



Tool Bar Closed



## Mouse Basics

DigiView software uses the mouse position and mouse clicks to determine which window will respond to mouse wheel movement and keyboard actions. It also responds to Left and Right mouse clicks on the same item with different actions. The Middle mouse wheel (button) is also utilized when clicked. When moving the mouse over a docked window or clicking on its border or tool bar, its contents will appear to depress with a line drawn around it, meaning it will now respond to any key strokes or mouse wheel movements.

**Focus Example:** If you position the mouse over a Waveform window, then press a cursor key, the window will scroll (see [Waveform View Mouse Functions](#)<sup>[13†]</sup>).

**Left/Right Click Example:** A Left-Click on a [Search Button](#)<sup>[178]</sup> will search backwards from the point clicked, while a Right-Click on a Search Button will search forward from the point clicked. Most symmetrical or opposite functions utilize a Left and a Right click.

**Middle Mouse Button Example:** Clicking the middle mouse button in a Waveform View will activate [Quick Measurements](#)<sup>[153]</sup> and the measurement starting point in Waveform Views.

### 1.3.1 Top Tool Bar

The tool bar at the top of the main application window provides fast access to the main menu, several common project functions, analyzer control buttons and a hardware status message.



**The Main Menu** - Opens the vertical application menu. Access all major features, project settings, search definitions, windows, configuration options, printing, saving images and exporting from a single menu format.



**Project Selections** - Opens the [Project Selections](#)<sup>[21]</sup> window to start a new project, choose an existing project or load an example.



**Save Project** - Saves the project including the currently loaded capture data. See [Project Operations](#)<sup>[20]</sup>.



**Project Settings** - Opens the [Project Configuration Options](#)<sup>[29]</sup> window. Create [Signal Definitions](#)<sup>[31]</sup>, formulate a [Trigger](#)<sup>[64]</sup>, set the [Analyzer options](#)<sup>[88]</sup> and control the [Capture History](#)<sup>[120]</sup> and [Acquisition options](#)<sup>[97]</sup>.



**Add a New Signal** - Opens a selection window for creating and adding a [Signal](#)<sup>[31]</sup> definition to the project.



**Delete a Signal** - Opens a selection menu of all Signal Definitions currently in the project. Selecting an item will remove it from the project and any other windows or configurations such

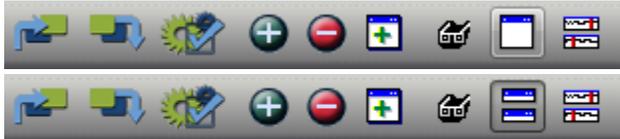
as Trigger configurations, Search definitions, Tables and List views.



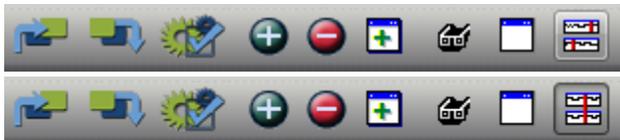
**Open a Feature Window** - Select from several feature windows such as another [Waveform View](#)<sup>[127]</sup>, a [Measurements](#)<sup>[150]</sup> window, an [Auto Search](#)<sup>[180]</sup> window, a [Marker Time/Delta](#)<sup>[161]</sup> window, a [Status](#)<sup>[122]</sup> window or create a [Tabular View](#)<sup>[127]</sup> for any Signal Definition in the project.



**Search Manager** - Opens the [Search Manager](#)<sup>[179]</sup> window or brings it into view if already open. Manage [Search Definitions](#)<sup>[172]</sup> and perform [manual searches](#)<sup>[178]</sup> directly from this window.



**Single or Split Waveform View** - Two waveform views are always present in the center of the main application window. This button toggles the visibility of the secondary [Waveform View](#)<sup>[127]</sup>.



**Link and Unlink Waveforms** - The Primary and Secondary Waveform views are permanently assigned to Link Groups 1 and 2 respectively. Use this button to temporarily cross-link the two groups so that all windows in both groups will stay time synchronized when any window of either group scrolls. Normally this would occur only within the same [Link Group](#)<sup>[171]</sup>.



**Analyzer Control and Status Message** - Control buttons to activate the Analyzer's run modes (Preview, Auto Run, Run Once) and manually return the Analyzer to its idle mode of pre-filling (Stop and retrieve partial capture or Halt and discard partial capture). For details see [Capturing Data](#)<sup>[117]</sup>.

A Status Message and trigger indicator are displayed immediately to the right of the Analyzer control buttons. For Details see [Hardware Status](#)<sup>[119]</sup>.

### 1.3.2 Bottom Tool Bar

The tool bar at the bottom of the main application window provides fast access to the Capture History, the Analyzer Buffer progress, clearing the analyzer buffer, Analyzer status indicators and the project's assigned analyzer configuration.



Configuration: DV3400 (200 Msps / 36 Channels)

**The Project's assigned analyzer configuration** - On the left of the bottom tool bar is displayed the Analyzer model and mode the project is configured to use. To configure the project for a different analyzer model or mode without starting from scratch, use the Convert Project option (see [Converting a Project](#)<sup>[25]</sup>).



**Capture History Buttons and Selection Bar** - Buttons to access the Capture History menu, Capture History Acquisition Options, Browsing, Bookmarking and deletion. The Bar Graph also behaves similar to a scroll bar by providing a means to quickly load a capture and see it's relative position in the history. For complete details see [Capture History](#)<sup>[120]</sup>.



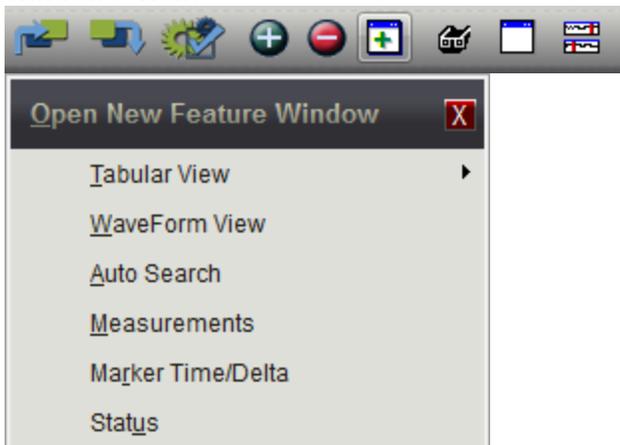
**Hardware Buffer and Status** - On the right of the bottom tool bar is the Hardware Buffer progress and status indicators. A Right-Click anywhere in the Buffer Progress indicator will clear the Analyzer's internal storage buffer. For complete details see [Hardware Status](#)<sup>[119]</sup>.

## 1.4 Window Arrangement

DigiView makes extensive use of Docking and Tabbing to permit very flexible window arrangements. All window settings, positions and sizes are saved along with the captured data anytime you save a project file. If the Auto Save feature is enabled this will also occur when exiting the program or opening a different project. These settings are all restored when you start the software or load an existing '.DVPAT' file (see [Project Operations](#)<sup>[20]</sup>).

The main application can be referred to as the Primary or Main window. The feature windows created from the Feature Windows menu or from the 'Windows' item of the main menu can be referred to as secondary windows.

To open a new window, select the "Feature Window" button from the main tool bar or select **Menu-> Window-> New**.



After opening a new window you can choose to move it anywhere on any monitor (multiple monitors are supported) or dock it into one of the 6 docking areas of the primary window. You can also create a Tabbed set of windows by docking it into a secondary window, even if that window is already docked.

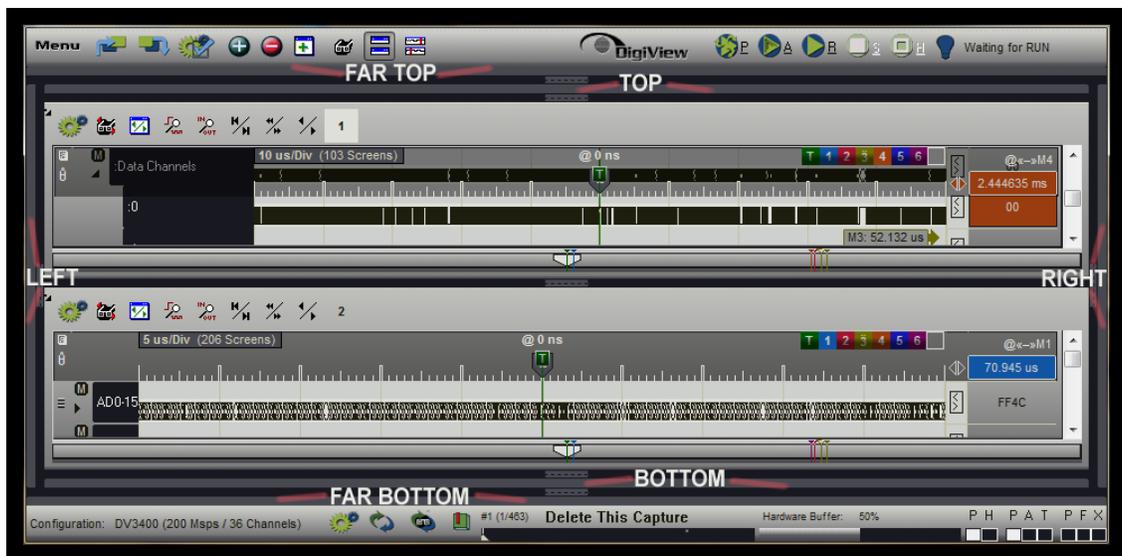
- [Docking Windows](#) <sup>10</sup>
- [Tabbing Windows](#) <sup>12</sup>
- [Alignment Management](#) <sup>18</sup>

## 1.4.1 Docking Windows

### Dock Sites

The main application form has 6 docking sites that surround the two permanent Waveform Views that are in the center of the window; top, bottom, far top, far bottom, left and right. Any of the secondary windows can be 'docked' to one of these sites by dragging the window over the site. To prevent docking while dragging a window near a dock site, hold the Control key down while dragging.

Docking sites are invisible until a window has been docked. After docking a window, the dock displays a "handle" that can be used to size the dock or even close it. When all docked windows are removed from a dock it will automatically close and become invisible again. The image below was taken after docking a window in each site and then closing the dock so their locations are visible. The visibility of a closed dock site depends on the chosen color theme. The default theme (Slate) is used for all images in our documentation.



### Docking a Window

When dragging a window over a docking site, a red rectangle appears to indicate that the dock site is willing to accept the window. Releasing the mouse button at this point docks the window to the main form at this spot.

Multiple windows can be docked into each of the dock sites in a variety of positions. As you drag additional windows over a given dock site, a different red rectangle indicates where the window would split into the dock site. You can drag it near the top, far top, bottom, far bottom, left or right edges to control the placement.

If you drag the window inward a bit more, the rectangle may change slightly to indicate a willingness to split the space occupied by an existing docked window rather than the dock site itself. Dragging the window further towards the center of a docked window will cause the rectangle to center in the window, which indicates the new window will "TAB" with the existing window (see: [Tabbing Windows](#)<sup>[12]</sup>). This flexibility allows you to dock the windows in virtually any configuration.

**Floating a Window**

To 'undock' a window, simply drag it off of the dock site by its title bar, double-click its title bar or click on the up arrow in its upper right corner (up arrow undock feature is only available for Tabbed Windows). To remove a window from a group of tabs, simply drag its tab away from the group and it will become an independent window again. Any docking window can be undocked or removed from a Tab group by using the window's local menu.

**Docking Override**

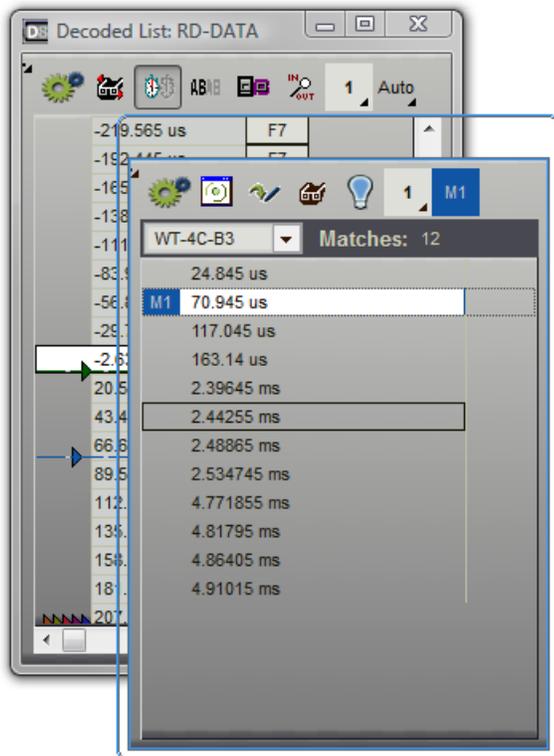
If you wish to drag a window near a dock site but do not want it to actually dock, hold down the control key while dragging. This will disable the docking behavior, allowing you to drop the window without docking it.

(also see: [Tabbing Windows](#)<sup>[12]</sup>).

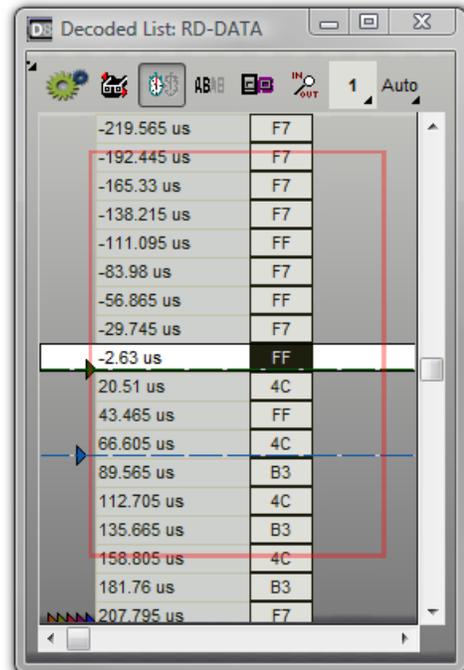
## 1.4.2 Tabbng Windows

Secondary windows can be merged together by dragging one window over another. When you drag any secondary window over another secondary window, a centered rectangle line appears.

**Dragging one window over another**

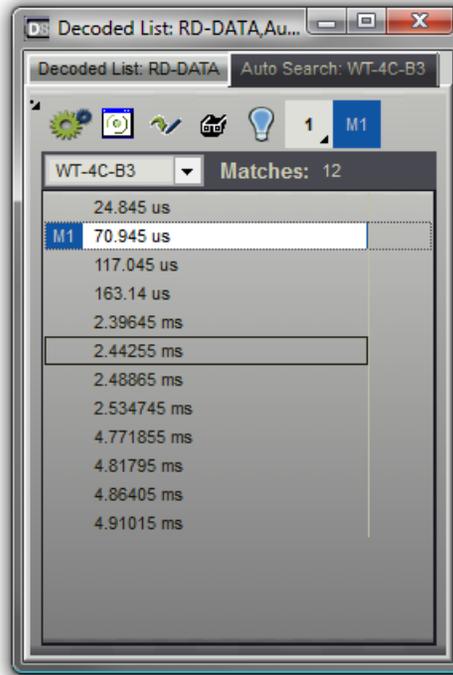


**Docking rectangle indicates the two windows will 'Tab' together**



This indicates that dropping the window at this point will merge them together into a single window. Each original window appears on a TAB in the new window. Dropping additional

windows onto the tabbed window creates additional tabs.



Tabbed windows can be docked just like any normal window. Also, a secondary window can be tabbed with a secondary window that has already been docked. Simply drag the window over the center of the docked window until you see the centered red rectangle. This will TAB them together at the docked location rather than dock the new window next to the existing window.

#### Floating a tabbed window

You float a tabbed window just like a normal secondary window; simply drag it off of the dock site using its title bar, double-click its title bar, click on the up arrow in its upper right corner or Right-Click on the tabs and select Undock. This will float the entire tabbed window, keeping all of its tabs intact.

#### De-Tabbing a window

To remove a window from a tab, simple grab the tab and drag it or double-click on the tab. This extracts the window from the tabs and floats it. When only two windows are tabbed together and one of these is removed, the tabbed window will be disposed of and the remaining window will now occupy the position previously occupied by the tabbed window. If the tabbed window had been docked, then the remaining window is now docked in its place. See [Docking Windows](#)<sup>[10]</sup> for more information on docking.

#### Tab Window Options

After "Tabbing" windows together, several display options are available from a pop-up menu that is accessible by Right-Clicking on any of the Tabs. For details on these options, see [Tab Window Options](#)<sup>[14]</sup>.

(also see: [Docking Windows](#)<sup>[10]</sup>, [Tab Window Options](#)<sup>[14]</sup>).

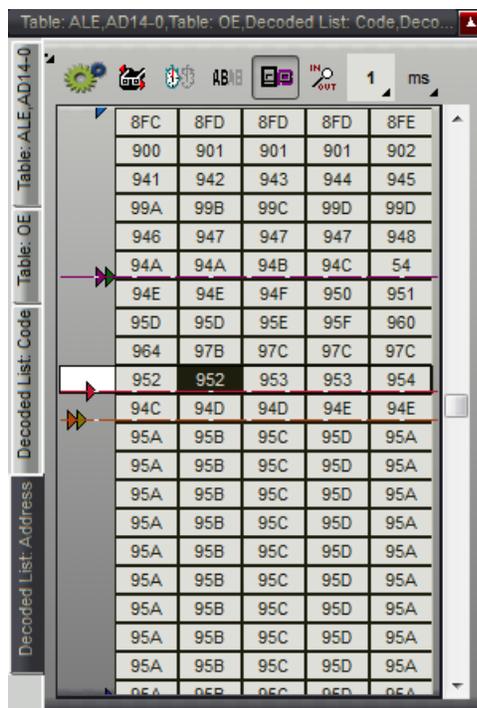
### 1.4.2.1 Tab Window Options

After "Tabbing" windows together, several display options are available from a pop-up menu that is accessible by Right-Clicking on any of the Tabs. Available options depend on the selected Tab Orientation.



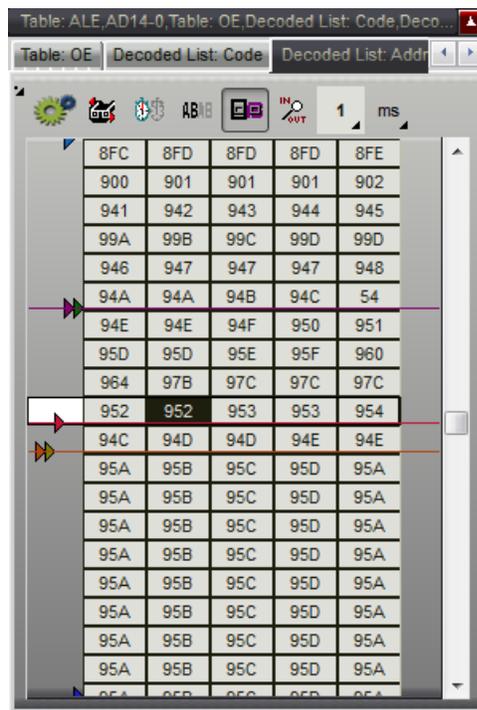
#### Tab Orientation

Options are TOP, LEFT, BOTTOM, RIGHT. Choose one of these options to change the placement of the Tabs in a tabbed window.



## Tab Rows

Options are SINGLE, MULTIPLE. Choose multiple to have the tabs align in a single row with "scroll buttons" on the right. Choosing multiple will change the tabs to the default multiple row behavior and remove the "scroll buttons". Tab orientation must be set to Top or Bottom to select the Single option.

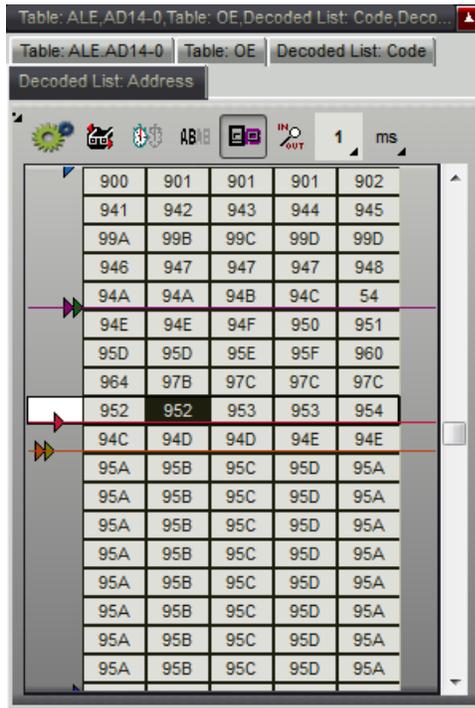


The screenshot shows a software window titled "Table: ALE, AD14-0, Table: OE, Decoded List: Code Deco...". The window contains a table with 5 columns and 20 rows. The second row is highlighted in black. The interface includes a toolbar with various icons and a status bar at the bottom.

8FC	8FD	8FD	8FD	8FE
900	901	901	901	902
941	942	943	944	945
99A	99B	99C	99D	99D
946	947	947	947	948
94A	94A	94B	94C	54
94E	94E	94F	950	951
95D	95D	95E	95F	960
964	97B	97C	97C	97C
952	952	953	953	954
94C	94D	94D	94E	94E
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A

## Tab Size

Options are STRETCH TO FIT, NORMAL. Choose "stretch to fit" to have the tabs "fill" the available space when multiple rows are present. Select "normal" to size the tab to the length of its text.



The screenshot shows a software window with a table of data. The window title is "Table: ALE\_AD14-0; Table: OE\_Decoded List: Code\_Deco...". The table has 5 columns and 20 rows. The data is as follows:

900	901	901	901	902
941	942	943	944	945
99A	99B	99C	99D	99D
946	947	947	947	948
94A	94A	94B	94C	54
94E	94E	94F	950	951
95D	95D	95E	95F	960
964	97B	97C	97C	97C
952	952	953	953	954
94C	94D	94D	94E	94E
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A

The 'Tab Size' dropdown menu is open, showing options for 'STRETCH TO FIT' and 'NORMAL'. The 'STRETCH TO FIT' option is selected, and the table cells are stretched to fit the text. The 'NORMAL' option is also visible, which would size the cells to the length of the text.

## Tab Style

Options are TABS, BUTTONS, FLAT BUTTONS. Tab orientation must be set to "TOP" to select the option of Buttons or Flat Buttons.

Table: ALE,AD14-0,Table: OE,Decoded List: Code,Deco...  
Table: ALE,AD14-0 Table: OE Decoded List: Code  
Decoded List: Address

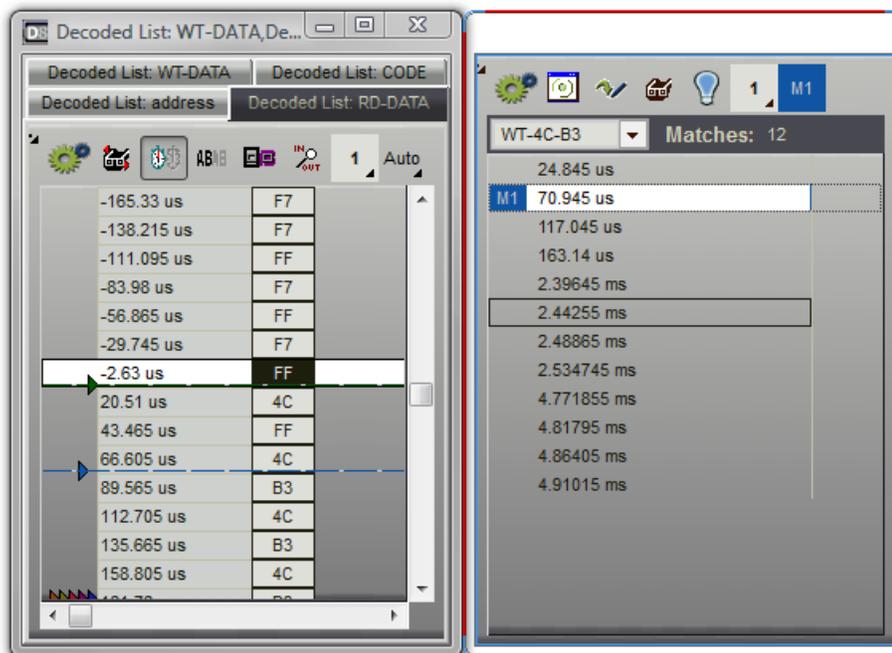
900	901	901	901	902
941	942	943	944	945
99A	99B	99C	99D	99D
946	947	947	947	948
94A	94A	94B	94C	54
94E	94E	94F	950	951
95D	95D	95E	95F	960
964	97B	97C	97C	97C
952	952	953	953	954
94C	94D	94D	94E	94E
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A
95A	95B	95C	95D	95A

### 1.4.3 Alignment Management

When not docked inside the main window, all windows have Alignment Management to assist positioning when near the main application or each other. The frame of the window being moved will become transparent for better visibility and highlight 2 of its edges (top or bottom and left or right) that align with the closest neighboring window.

When within a few pixels of alignment to a neighboring window, it will assist placement by gently resisting an overlap which effectively helps to 'snap' it into position. This method is more user friendly than the strong "magnetic" placement used by other applications and is especially beneficial when near multiple windows.

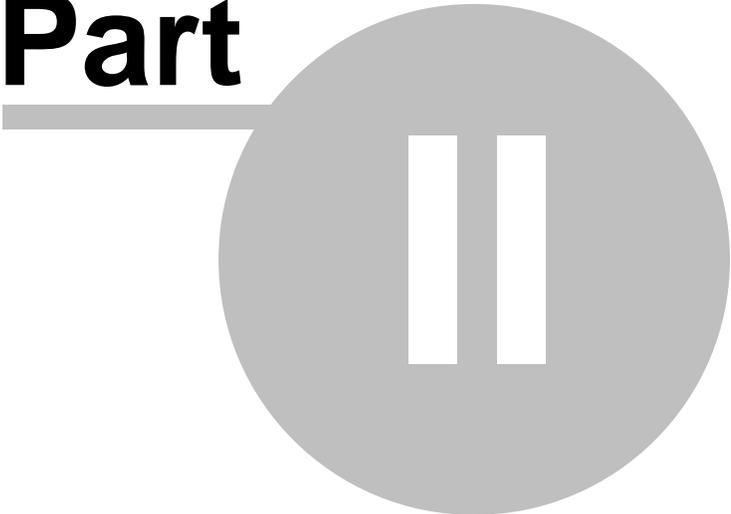
In the image below, the alignment of the left and top sides of the window being dragged is assisted for placement next to the tabbed window on the left.



To override Alignment Management, hold the CTRL key while positioning a window.

# Project Operations

**Part**



## 2 Project Operations

The DigiView software is project oriented in order to save and restore specific settings such as Analyzer Model, Signal Definitions, Search Definitions, Trigger Configurations, Window placement, Capture History and so forth.

When launching the software, the Project Selections window will open first so you can create a new project, open an existing project or load an example project that includes captured data.

### Project Selections



The Project Selections Window can be opened at any time using the "Open Project Selections" button from the main tool bar or by selecting **Menu-> Project-> Project Selections**. It will also open automatically when the software first launches.

For Details see [Project Selections](#) <sup>21</sup>.

### Starting with a new Project

If you want to create a new blank project, then select "New Project" from the Project Selections Window.

For Details see [Creating a New Project](#) <sup>23</sup>.

### Saving a Project



To save a project, select the "Save Project" button from the main tool bar or select **Menu-> Project-> Save Project**. This will save the current settings using the same name. This will also copy the currently viewed capture into the project file so that this data will be viewed the next time the project is opened, even if you manually delete the history folder, manually move the project or send it to a colleague.

### Auto Save/Restore

The "Auto Save" and "Restore last Project" options are found in the Environment settings. When both of these options are enabled, DigiView auto-saves the current data, settings and state of the project when you exit the program (or load a different project) and auto-loads the last opened project when you start the program. This allows you to pick-up where you left-off the next time you start the software without having to save/restore. You can still save the project manually anytime you need by selecting the "Save Project" button on the main tool bar.

See Also: [Environment settings](#) <sup>113</sup>

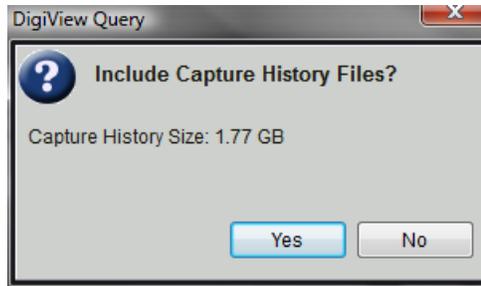
### Saving the Project with a new name or to a different directory

To save a to a new location or with a different name, select **Menu-> Project-> Save Project As**. When saving this way, the entire Capture History can be copied to the new location and/or name

as well.

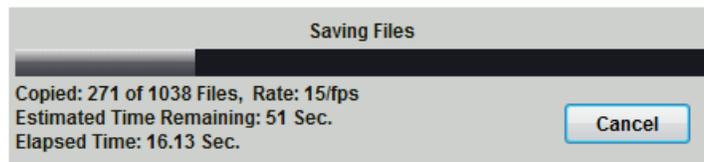
See Also: [Capture History](#)<sup>[120]</sup>.

The Save Project As function will prompt you for a new name and location by opening a system folder window. After making your selections, the DigiView software will ask permission to copy the capture history to the new project.



If you select yes when prompted, the entire capture history for the current project will be copied to the new project's location and name. Since the Capture History is stored in a sub-folder using the project's name, it is safe to create projects in the same directory. The "Copy History" prompt also displays the amount of disk space being used by the history files and will copy as many files as free space allows, leaving a safety margin.

The most recent captures are copied first (and kept in chronological order) in case you do not have enough space available or if you decide to cancel before the entire history is copied.



## Converting a Project for a New Analyzer

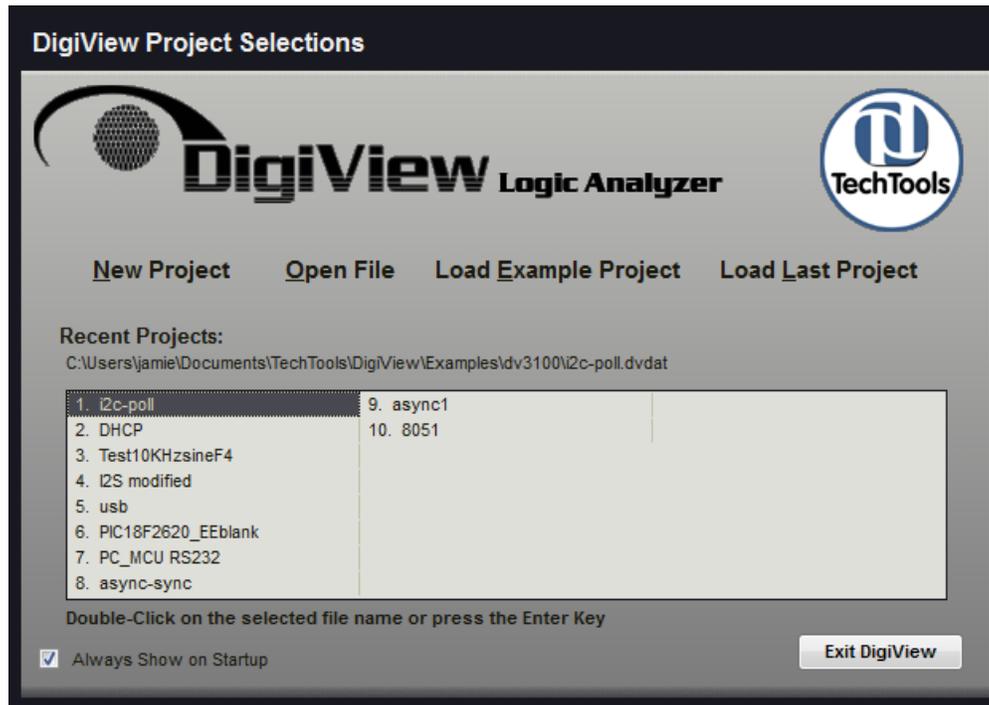
You may wish to open a Project configured for a different Analyzer model than the one currently attached to your PC. If the analyzer is already attached when you open the older project, the DigiView software will prompt you for conversion. However, you can manually start the conversion by selecting **Menu-> Project-> Convert Project**.

We suggest saving the project with a new name before converting a project if you want to preserve the capture history.

For Details see [Converting Projects](#)<sup>[25]</sup>.

## 2.1 Project Selections

When first launching the software you can choose from several common project options. To prevent the Project Selections window from opening first, simply uncheck the "Always Show on Startup" check box. This feature can be re-enabled at any time from [Environment Options](#)<sup>[113]</sup>.



**New Project** **Open File** **Load Example Project** **Load Last Project**

Select the New Project button to create an entirely new project by choosing the analyzer model and mode. The project is automatically named and temporarily stored until you save the project. If you close the software or load another project without saving, the project will be discarded.

See Also: [Creating a New Project](#) <sup>23</sup>

**New Project** **Open File** **Load Example Project** **Load Last Project**

Select the Open File button to explore your computer storage and find a previous project to open. DigiView software registers the DVDAT file extension with the operating system and filters the browsing to only show these files. If you are browsing from the operating system instead of first launching the DigiView software, you can "open" the file directly and the DigiView software will automatically launch and skip the Project Selections window.

**New Project** **Open File** **Load Example Project** **Load Last Project**

To see Analyzer specific DigiView projects that include a real-data capture, then Click on the Load Example Project button.

**New Project** **Open File** **Load Example Project** **Load Last Project**

Moving the mouse over the Load Last Project button will highlight the previously opened project in the Recent Project list (it is always highlighted when the Project Selections window opens if it is available). Select this button to open it.

## Recent Projects

The recent projects list will display the file name of the last 24 projects opened. When a project is highlighted (by using the mouse or the cursor keys) the full file path is displayed just above the list.

Double-Click on any filename to open the project.

Press the Enter Key to open a project that is already highlighted.

## Always Show on Startup

Uncheck the "Always Show on Startup" check box to prevent the Project Selections window from opening when launching the software. When unchecked, the last opened project will automatically load instead. This option can be configured at any time from Environment Options.

See Also: [Environment Options](#)<sup>[113]</sup>

## Exit DigiView

Press this button or use the Escape Key to exit the program without loading or creating a project.

## 2.2 Creating a New Project

### Steps to create a new project

- A. Select the Analyzer Model and Sample Mode.
- B. Set the project name and location.
- C. Define the Signals and associated channels if needed

To create a new project, open the the Project Selections Window and click on the "New Project" button.



The Project Selections Window can be opened at any time using the "Open Project Selections" button from the main tool bar or by selecting **Menu-> Project-> Project Selections**. It will also open automatically when the software first launches.

For Details see [Project Selections](#)<sup>[21]</sup>.

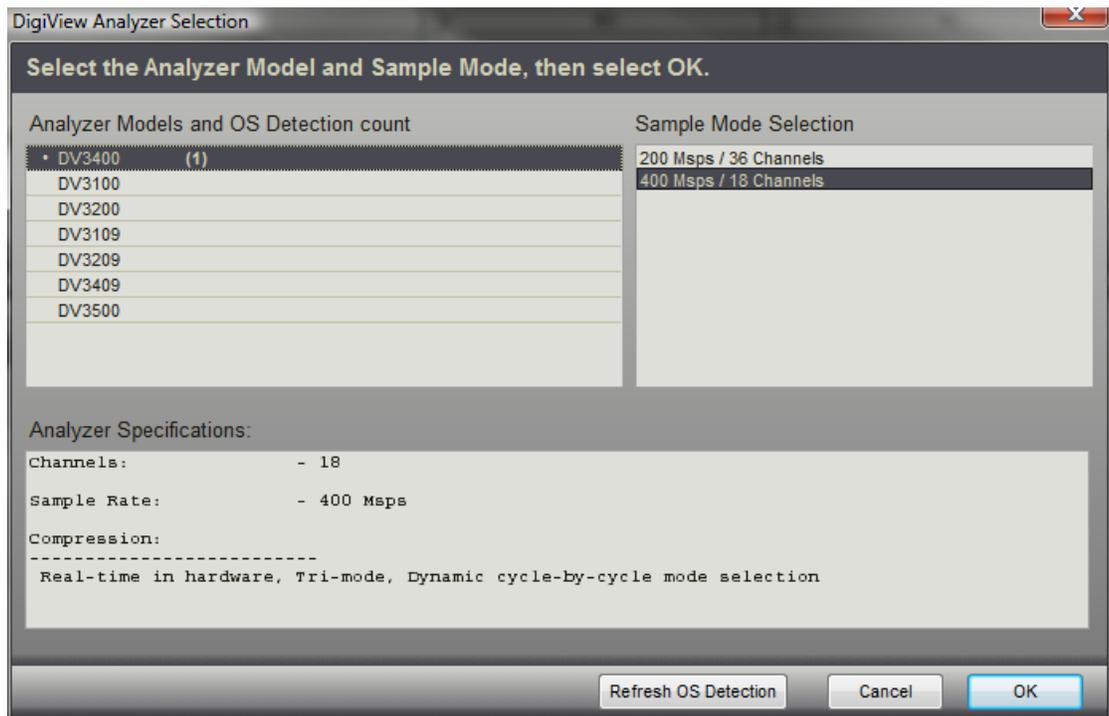


Once opened, click on the New Project button to open the Analyzer Selection window.

### A. Select the Analyzer Model and Sample Mode

When creating a new project file, you must select the proper analyzer model and preferred

sampling mode. For this reason, the software will provide a selection window with information regarding any detected hardware as shown below. Simply select the Model and the Sampling Mode, then click on the "OK" button to create the new project. If you do not want to create a new project, then select cancel to continue with the currently loaded project.



## B. Select the Name and Location

After selecting "OK", a system folder window will open for you to enter a new name and location. After making your selections, the project is created and opened.

## C. Define the Signals

A new project always adds a default BUS signal with all available channels assigned to it. At this point, you could press the Preview Button and instantly capture data as a single BUS. To see the individual channels of the BUS, expand it by clicking the expand button beside its name in the Waveform Window.

for Details see: [Capturing Data](#)<sup>[117]</sup> and [Waveform Views](#)<sup>[127]</sup>

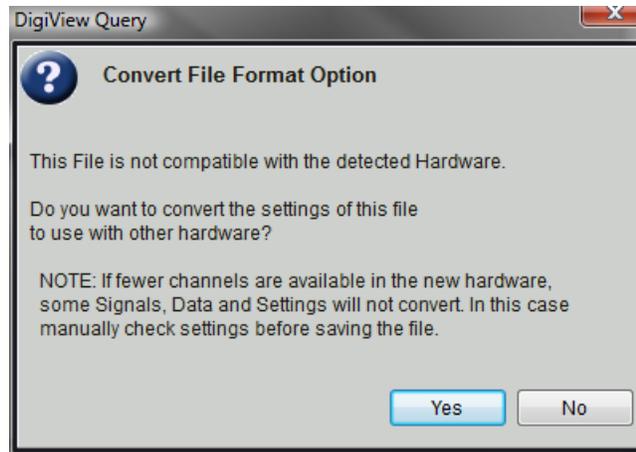
To select a specific signal type and associate physical channels to a signal, see [Defining Signals](#)<sup>[31]</sup>.

You will want to configure additional features as you capture and analyze the data such as Configuring a Hardware Trigger, Defining a Search or selecting specific measurements.

See Also: [Configuring a Hardware Trigger](#)<sup>[64]</sup>, [Search Features](#)<sup>[172]</sup>, [Selecting Measurements](#)<sup>[150]</sup>

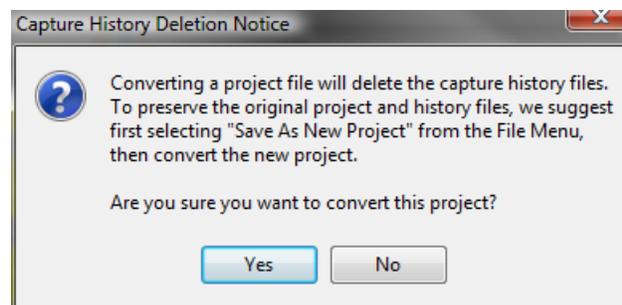
## 2.3 Converting Projects

When opening a project that is configured for a different analyzer than the one physically connected to the computer, the software will offer to convert it for you rather than having to start a project from scratch that matches your current one. If no conversion is needed simply select No to dismiss the prompt.

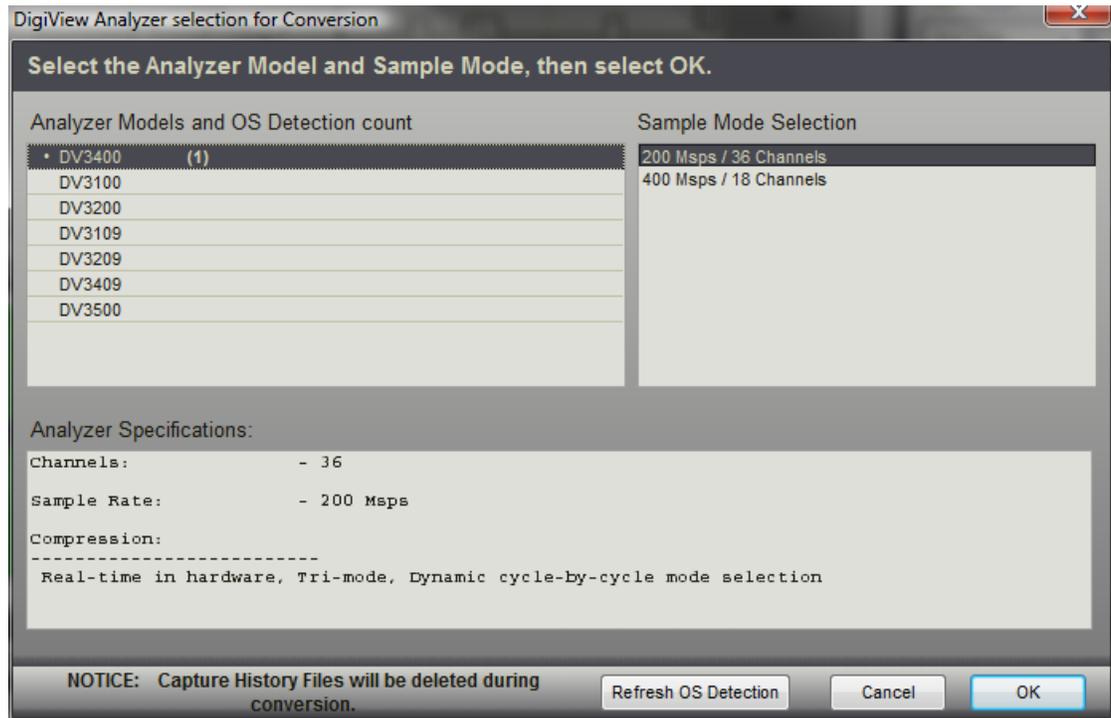


You can also manually activate the conversion at any time If you want to use the same project configuration with a different model of analyzer or a different analyzer mode. To manually start the conversion select the "Convert Project" option from **Menu-> Project->**.

We suggest saving the project with a new name before converting if you want to preserve the capture history. The history files are not converted and will be deleted for the project being converted. After selecting YES or manually starting a conversion, a prompt will remind you of the History deletion and request permission to proceed. Select No if you want to save the project with a new name, otherwise select yes to proceed.



After selecting YES, the Analyzer selection window will open.



### Analyzer Models and OS Detection Count

This area lists all models of DigiView that are compatible with this version of Software. The software automatically selects the attached device when this window first opens. Next to each model's name is the enumerated count as detected by the Operating System (OS). The count will refresh automatically if the number of attached devices changes while this dialog is open.

Note: Hardware does not have to be present. You can convert the project to any model and mode.

### Sample Mode

This area will change to offer any modes available to the analyzer model selected on the left. As you choose a mode, its details will display in the Analyzer Specifications area.

### Refresh OS Detection

If you do not see a detection count next to the model of an attached device, try pressing the Refresh OS Detection button. If the count is still missing, then the Operating System is having difficulty identifying the analyzer and has not enumerated it on the USB bus. You may need to use a different USB port or verify that you are using a high bandwidth USB cable or the one supplied with the analyzer.

### Cancel

You can still choose to stop the conversion at this point by pressing the Cancel button. The window will close and no action will be taken to convert the project.

### OK

Proceed with the conversion as configured.

NOTE: If you convert a project to an Analyzer or mode that has fewer channels than its Signal Definitions are configured to use or the definitions use a higher channel number than available, many configuration items will be incomplete or invalid. The software will disable invalid Signal definitions, Search definitions and all other uses of an invalid Signal definition. Visual indicators will be present after the conversion if any item is disabled during conversion.

# Configuration

**Part**



## 3 Configuration

The DigiView software is designed to make configuration an easy task and less time consuming than most PC based analyzer systems. The easier it is to configure and understand your Capture and Analysis tool, the easier it will be to achieve successful results.



To access the Project Configuration Options window, click the Project Settings button on the tool bar or select **Menu-> Configure->** and the name of the configuration group (Color Themes and Environment options are not project specific and are only available from this menu).

After the hardware is connected to the PC, the first step of configuration is to attach the physical channels to the circuit and create a Signal definition that uses those channels.

The first topic in this section, after some brief USB information, covers the physical channel connections and cable color scheme. The next section provides detailed information on defining trigger conditions and associating a signal type with the physical channels. The remaining sections deal with user preferences.

- [USB Connection](#) <sup>[4]</sup>
- [Connecting Data Lines](#) <sup>[29]</sup>
- [Defining Signals and Triggers](#) <sup>[31]</sup>
- [Plotting Signal Data](#) <sup>[61]</sup>
- [Analyzer Options](#) <sup>[88]</sup>
- [Acquisition Options](#) <sup>[97]</sup>
- [Color Themes](#) <sup>[100]</sup>
- [Using the Color Selection Dialog](#) <sup>[112]</sup>
- [Environment Options](#) <sup>[113]</sup>

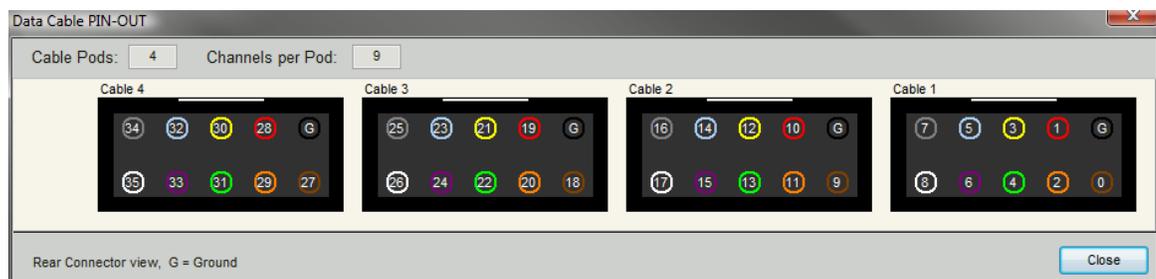
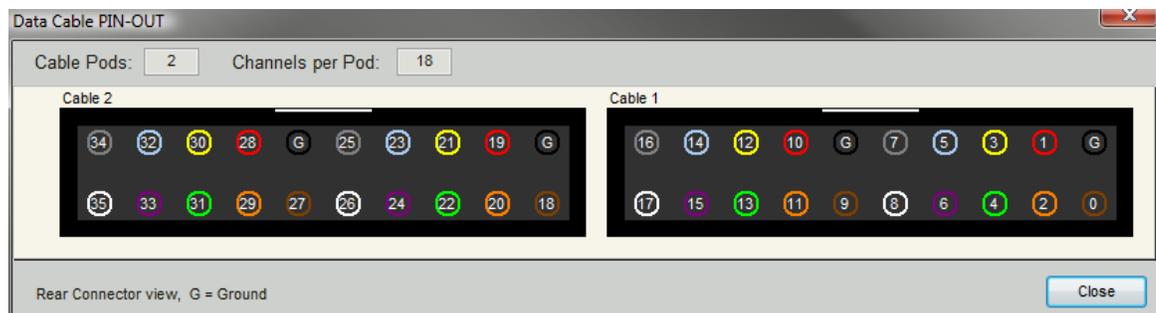
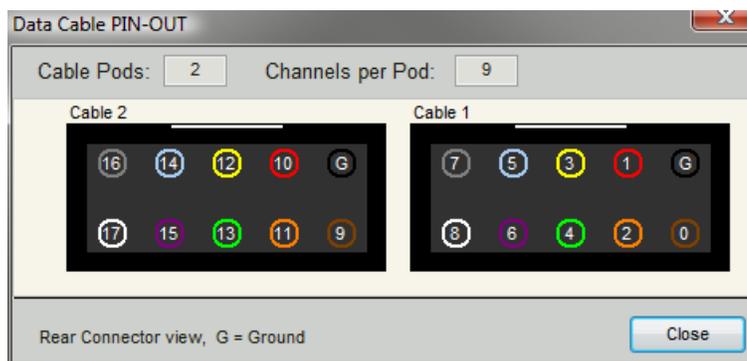
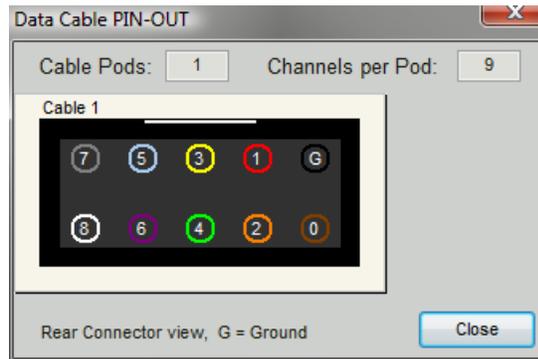
### 3.1 Connecting the Data Lines

The DigiView data cable has either 18 data lines and 2 grounds or 9 data lines and 1 ground. The 18 channel cables are partitioned into 2 identical groups. **Each group has a ground and 9 data signals.** The leads are color-coded. Black is ground, brown is the first data signal, red is the second data signal and so on in standard resistor color-code order. Additional groups of signals follow the same pattern.

The images below show the physical layout of the cable, channel numbers and color codes on various models. This figure is available by clicking the "Cable Connector Pinout" button in Project Configuration Options window or from any [Signal Editor](#) <sup>[33]</sup> window. This opens a non-modal window so you can leave it open while you work if desired.



To access the Project Configuration Options window, click the Project Settings button on the tool bar.



The data cable is made of high quality, extremely flexible wire and high quality connectors. It is expensive, so please remember to pull on the connectors; not the wires.

The connectors are designed to mate to .025 square posts and can be side-stacked on 100mil centers, making them ideal for direct connection to standard square post connectors. Additionally, they mate firmly with the included micro-grabber hooks for connecting to IC leads.

DigiView Models DV3100, DV3109, DV3200, DV3209 and DV3409 are designed for signals in the -20 to 20V range. DigiView Models DV3400 and DV3500 are designed for signals in the -50 to 50V range. Standard overshoots and undershoots common to digital systems will not harm it. **The data lines have extra static protection circuits, current limits and impulse suppression.** However, mishandling could still damage them. Simply treat them like you (should) treat your valuable one-of-a-kind target and DigiView will give you years of service.

## 3.2 Defining Signals and Triggers

The hardware will ignore any data lines that are not defined as part of a waveform or part of a trigger. This prevents unused signals from eating up the sample buffer space, even if they are connected to active signals. Signal definitions that are disabled will not be displayed, but may still be captured if the definition includes a channel that is in use by another signal definition.



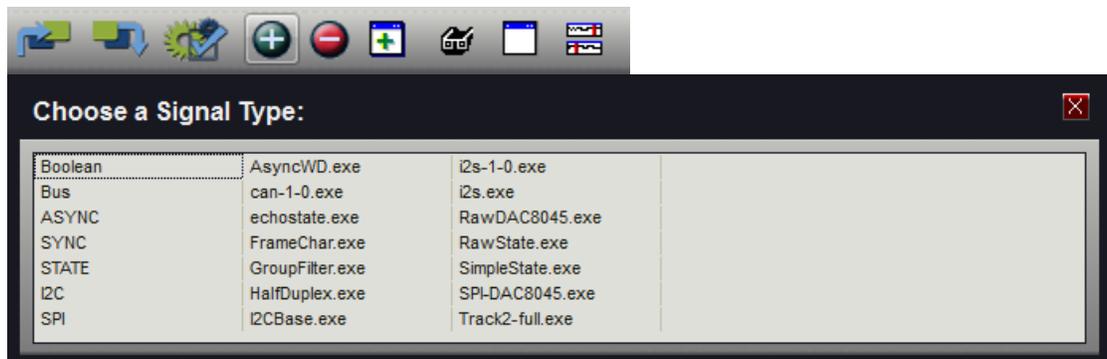
To access Signal and Trigger configuration options, click the Project Settings button on the tool bar then select the Signal Definitions tab or the Hardware Triggers tab.

- [Signals](#) <sup>31</sup>
- [Triggers](#) <sup>64</sup>

### 3.2.1 Signals

Current DigiView hardware has either 9, 18 or 36 physical channels. However, we like to think in terms of symbolic names representing individual signals (clock,ALE) or groups of signals (DataBus, Address) rather than channel numbers(0,1,2..). We start by defining SIGNALS in terms of CHANNELS. This is the only place we deal directly with physical channels. The remainder of the software deals in terms of signal names rather than channel numbers. When we define signals, we are mapping a signal NAME to one or more physical channels. This also makes it possible to share the same physical channel with multiple signal definitions (see: [Signal Editors](#) <sup>33</sup>).

#### Adding Signals to the Project



To create a Signal, select the "Add Signal" button from Tool Bar (or use the "Create Signal" button in the Project Configuration Options window).



**Changing the Signal order** - 

When adding a large number of signal definitions, you may want to change some of their positions to organize or group related signals. To change the display order, grab the small handle in the left margin with your mouse and drag the definition to a new position.

**Signal Name** -

AD14-0

The name of this signal definition. This value can be changed by editing the signal's properties. (see: [Signal Editors](#) <sup>33</sup>)

**Signal Colors and Type** -   , etc.

You can see the color of a signal and determine the type by this graphical indicator (displayed to the right of the name assigned to the signal). Each signal type will display a unique graphic with representative colors.

**Delete Signal** - 

You can delete a signal definition by clicking on the 'X'.

**Edit Signal Properties** - 

You can change the properties of a signal definition by clicking this button. (see: [Signal Editors](#) <sup>33</sup>)

**Enabled Status** -  

Indicates the enabled state of the signal. When the lightbulb is ON, the signal is enabled. Click this button to toggle the "enabled" status of the signal. This value can also be changed by editing the signal's properties. (see: [Signal Editors](#) <sup>33</sup>)

**Associated Channels** -

All channels associated with this signal definition will be indicated in this display as a square blue "dot". Channel 0 is in the farthest right column and the highest channel number is in the farthest left column (as marked in the header.) Light lines appear every 4th channel and non associated channels appear as a short dash. Also, colored squares at the top show each channel's wire color. Notice that there are only 9 colors so the color sequence repeats (channels 0, 9, 18 and 27 are brown - the color Black is used for ground connections).

**3.2.1.1 Signal Editors**

DigiView provides several "Signal" type definitions which allow unique methods of interpreting and displaying the raw data captured on the logic channels. Each Signal type has a unique editor with relevant options for its type. From the editor you will also assign some of the physical logic channels to be used for this new signal definition. (see: [Connecting Data Lines](#) <sup>29</sup>)

You may choose to repeat the use of some channels in multiple Signal definitions in order to interpret the data differently and gain a perspective that is relative to your current point of interest. This can be done easily by creating a new Signal using the definition with the properties you require. Using the same channels in multiple definitions will not have any effect on the actual capture, but can greatly increase your ability to analyze the data and present visual representation to others.

**NOTE:** The same channel can be assigned to as many signal definitions as you need. For instance, if you want to capture the Read and Write cycles of an SPI bus using separate signal definitions (instead of the combined read/write of the SPI signal type), you can create 2 Synchronous Serial signals and assign the same channel as the Clock for each definition.

## Signal Selection

The signal selection can be expanded by adding Plug-ins which can be downloaded with the software (as available) or created by using our free Plug-in Development Kit (downloadable from our website). The current 'built-in' Signal Types are listed below. Details of each type's properties are described in the following sections.

### [Asynchronous](#) <sup>[42]</sup>

Serial UART analysis, pre-selected and custom baud rates, channel inversion option, from 4 to 8 bit selectable, parity option, Framing options and Glitch filter.

### [Boolean](#) <sup>[35]</sup>

Single channel viewing.

### [Bus](#) <sup>[37]</sup>

Multi-channel viewing as a single value. Also suitable to display the capture of an Analog to Digital converter as an Analog Signal when the Plot Output option is selected (see: [Plotting Signal Data](#) <sup>[61]</sup>)

### [CAN BUS](#) <sup>[39]</sup>

Full featured Controller Area Network protocol decoder.

### [I2C](#) <sup>[45]</sup>

Complete I2C protocol analysis. 7bit/10bit addressing, High Speed Mode Master Codes, General Call support, Glitch filter.

### [I2S](#) <sup>[49]</sup>

Inter-IC Sound bus protocol decoder with word length selection from 4 to 32 bits.

### [SPI](#) <sup>[57]</sup>

Master/Slave data from two Synchronous Serial data channels using the SPI protocol.

### [State](#) <sup>[51]</sup>

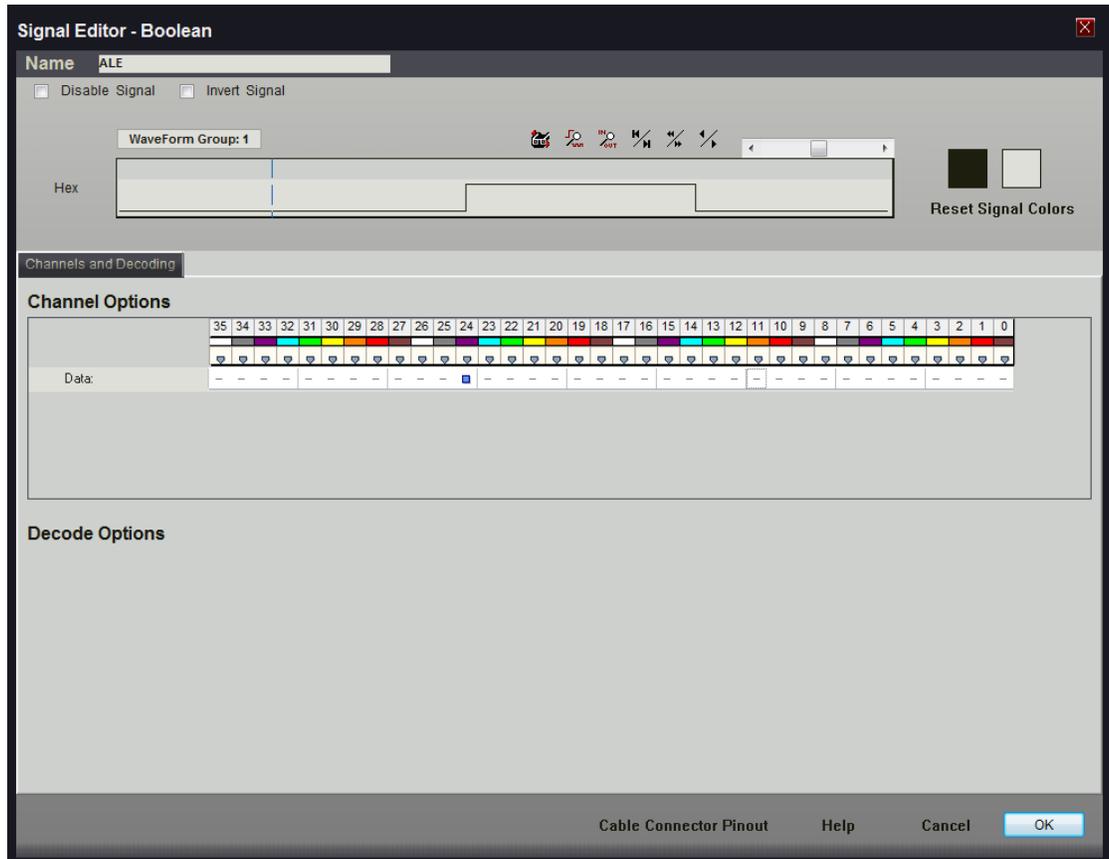
Filters multi-channel data by state of a single channel, selectable CLK/DATA inversion, selectable transition state of Rising/Falling/Both, Framing and timeout options, additional Select and Sync channel for filtering.

### [Synchronous](#) <sup>[54]</sup>

From 1 to 32 bit protocols, also suitable for SPI analysis, selectable CLK/DATA inversion, selectable Rising/Falling/Both clock edges, LSB/MSB selection, additional Select, Frame Sync and Field Sync channels for filtering and synchronizing.

## 3.2.1.1.1 Boolean

The Boolean Signal is the most common method of viewing captured data. Boolean Signals provide viewing of the logic level of a single channel at any given point in time.



### Signal Name

Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, Searches, Tabular Views, Exports, Trigger Configurations and all menu references.

### Disable Signal

Select (check) this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable capture space.

### Invert Signal

Check this item to have the value of the captured channels "inverted" before processing or displaying data for this signal definition. This setting will not effect any other signal definitions that may use the same channels.

### Color Selection & Examples

An example of the signal is displayed in the current color scheme, followed by an example of

the current color selections for this signal and a color reset button. Clicking on one of the color squares will open the [Color Selection](#)<sup>[112]</sup> dialog to change the Signal line color and its background color if a color other than the theme color is desired.

Above the example are controls to modify the portion of the waveform window being displayed.

### Reset Signal Colors

This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)<sup>[100]</sup>).

### Channel Options

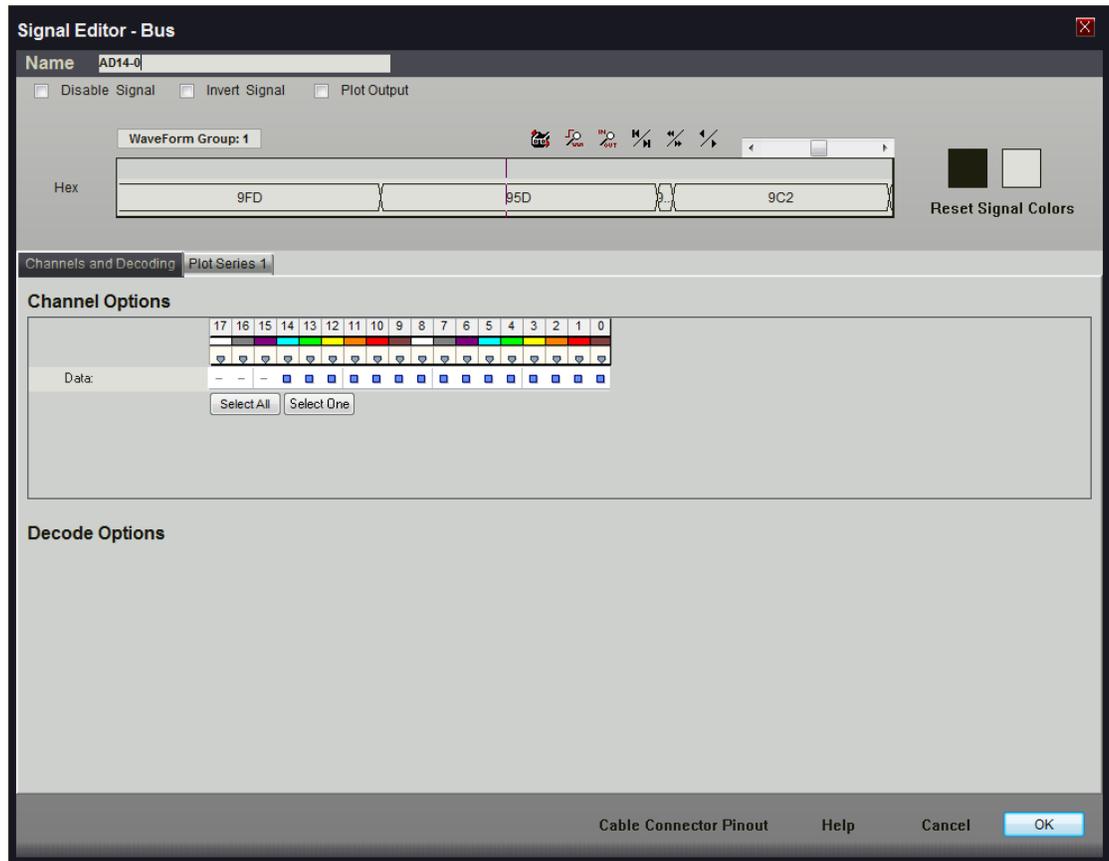
This is where you will associate a signal definition with the physical channels or connections to the outside world. Only one channel can be selected for the Boolean signal type. To select the channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)<sup>[29]</sup>). The channel selected for this signal will replace the " - " with a blue square (as shown above). If any other channel is already selected it will be de-selected. The gray arrow beneath each channel color is an activity indicator that displays the activity of the channel as compared to the activity of all the other channels (relational, not real time).

### Decode Options

No decode options are available for the Boolean signal type.

## 3.2.1.1.2 Bus

The Bus Signal is the second most common method of viewing captured data. Bus Signals provide viewing of multiple channels as a single value at any given point in time with additional features to Plot the data. A common use of Bus plotting is to see the captured output of an Analog to Digital converter as a single waveform (see: [Plotting Signal Data](#)<sup>[61]</sup>).



### Signal Name

Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, Searches, Tabular Views, Exports, Trigger Configurations and all menu references.

### Disable Signal

Select (check) this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable capture space.

### Invert Signal

Check this item to have the value of the captured channels "inverted" before processing or displaying data for this signal definition. This setting will not effect any other signal definitions that may use the same channels.

### Plot Output

Check this item to enable Plotting for this signal. If checked, all waveform views will display plotted data as defined by the Plot Series configurations. You must enable and configure at least one Plot Series before any plotted data is visible. Up to 4 individual plots can be configured for each signal. (see: [Plotting Signal Data](#)<sup>[61]</sup>).

### Color Selection & Examples

An example of the signal is displayed in the current color scheme, followed by an example of the current color selections for this signal and a color reset button. Clicking on one of the color squares will open the [Color Selection](#)<sup>[112]</sup> dialog to change the Signal line color and its background color if a color other than the theme color is desired.

Above the example are controls to modify the portion of the waveform window being displayed.

### Reset Signal Colors

This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)<sup>[100]</sup>).

### Channel Options

This is where you will associate a signal definition with the physical channels or connections to the outside world. To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)<sup>[29]</sup>). Channels that are selected for this signal will replace the " - " with a blue square as shown above. The gray arrow beneath each channel color is an activity indicator that displays the activity of the channel as compared to the activity of all the other channels (relational, not real time).

### Decode Options

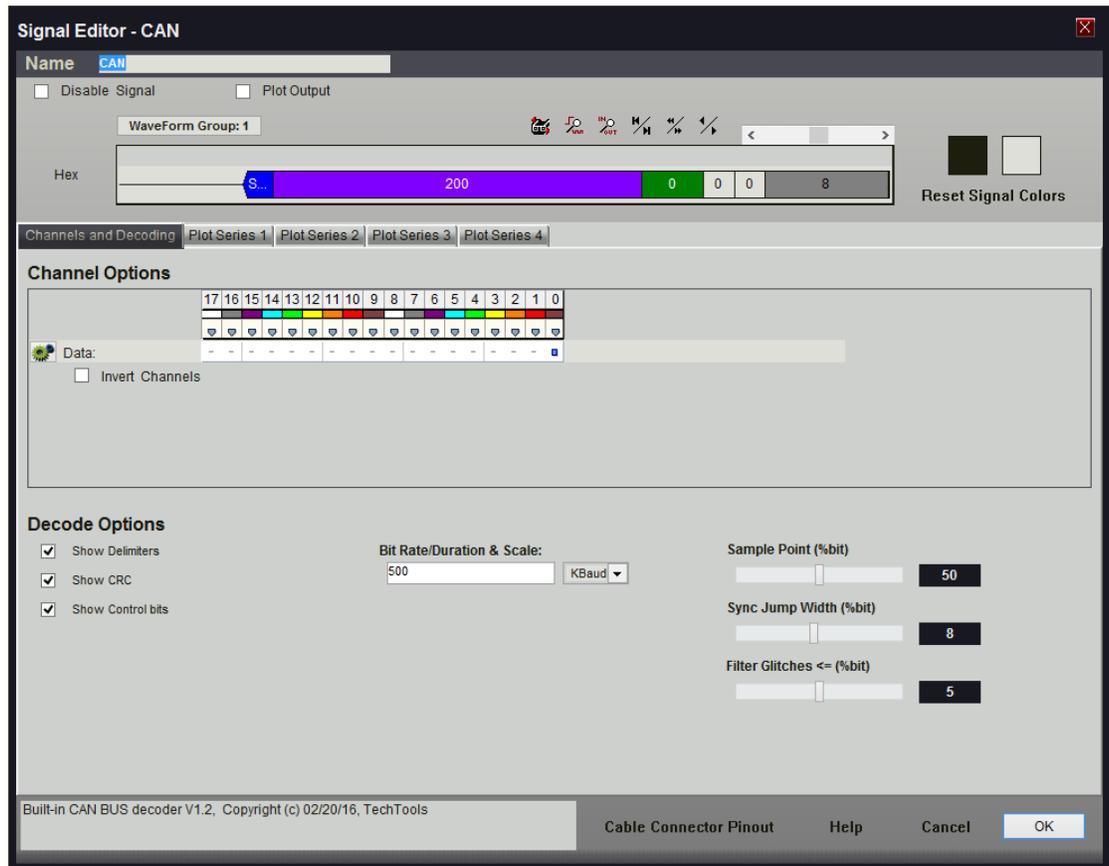
No additional decode options are available for the BUS signal type.

### Plot Series 1

If "Plot Output" is selected, one plot can be defined. If enabled and Plot Series 1 is defined, all waveform views will display the data in a plotted format. (see: [Plotting Signal Data](#)<sup>[61]</sup>).

## 3.2.1.1.3 CAN BUS

Use the CAN BUS Signal type to decode the Controller Area Network protocol. This full featured decoder will decode the entire CAN 2.0B specification.



### Signal Name

Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, Searches, Tabular Views, Exports, Trigger Configurations and all menu references.

### Disable Signal

Check this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable capture space.

### Plot Output

Check this item to enable Plotting for this signal. If checked, all waveform views will display plotted data as defined by the Plot Series configurations. You must enable and configure at least one Plot Series before any plotted data is visible. Up to 4 individual plots can be configured for each signal. (see: [Plotting Signal Data](#)<sup>[61]</sup>).

### Color Selection & Examples

An example of the signal is displayed in the current color scheme, followed by an example of the current color selections for this signal and a color reset button. Clicking on one of the color squares will open the [Color Selection](#)<sup>[112]</sup> dialog to change the Signal line color and its background color if a color other than the theme color is desired.

### Reset Signal Colors

This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)<sup>[100]</sup>).

### Channel Options

This is where you will associate a signal definition with the physical channels or connections to the outside world. Each signal definition type will have one or more channel selection groups and will allow one or more channels to be selected for each group. Each channel selection group will be identified on its left if more than one group is available for the signal type.

To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)<sup>[29]</sup>). Channels that are selected for this signal will replace the " - " with a blue square as shown above. The gray arrow beneath each channel color is an activity indicator that displays the activity of the channel as compared to the activity of all the other channels (relational, not real time).

### Data Channel Selection

Selects which physical channel to assign to DATA.

#### *Invert Channels*

If selected, the captured data for DATA will be inverted before decoding and displaying (only affects this Signal Definition).

### Show Delimiters

When selected, Delimiter fields will be visible in the output.

### Show CRC

When selected, CRC fields will be visible in the output.

### Show Control Bits

When selected, Control bits fields will be visible in the output.

### Bit Rate/Duration & Scale:

Specify a value for the Bit Rate or the Bit Duration, then select a scale for the value entered. Scale selections include Nano seconds (ns), Micro seconds (us), Milli seconds (ms), Baud, KiloBaud (KBaud) and MegaBaud (MBaud). Note that the value must be an integer (no floating point.) To specify something with a decimal point, select the next lowest range and enter a whole number. For example, 115.2 KBaud would be entered as 115200 Baud and 12.31us would be entered as 12310ns.

### Sample Point (%bit)

Specifies where we should sample the data within each bit cell as a percentage of the bit width. This defaults to mid-bit (50%) and can be adjusted to account for bus propagation delays, transceiver delays, bandwidth limitations, etc. This roughly corresponds to the combined settings of the SYNC\_SEG, PROP\_SEG and PHASE\_SEG\_1 mentioned in the CAN specification. Alternatively, it could be viewed as the total bit width - PHASE\_SEG\_2.

**Sync Jump Width (%bit)**

Specifies the percentage of a bit width to allow for resynchronization adjustments. This corresponds to the SJW parameter in the CAN specification.

The CAN specification allows for a wide tolerance on node oscillators. This is accomplished by requiring that nodes resynchronize on passive->dominate edges. The receivers compare the actual timing of these edges with the ideal timing at the specified baud rate and then make adjustments to their internal timers to resynchronize with the incoming data. This parameter specifies the maximum adjustment we will make when resynchronizing.

Increasing this number increases our ability to properly decode packets involving nodes with low accuracy oscillators at the expense of increased noise sensitivity. Lower numbers improve noise rejection but reduces our ability to work with nodes with low accuracy oscillators. You usually set this lower if all nodes use crystal oscillators for their baud rate reference, and higher if any of them use ceramic resonators or other low accuracy sources for their baud rate references.

Be aware that the (SAMPLE-POINT + SJW) should be less than 100% and that (SAMPLE-POINT - SJW) should be greater than 0.

**Filter Glitches <= (%bit)**

Specifies filtering of pulses that are less than or equal to the specified percentage of the Bit width.

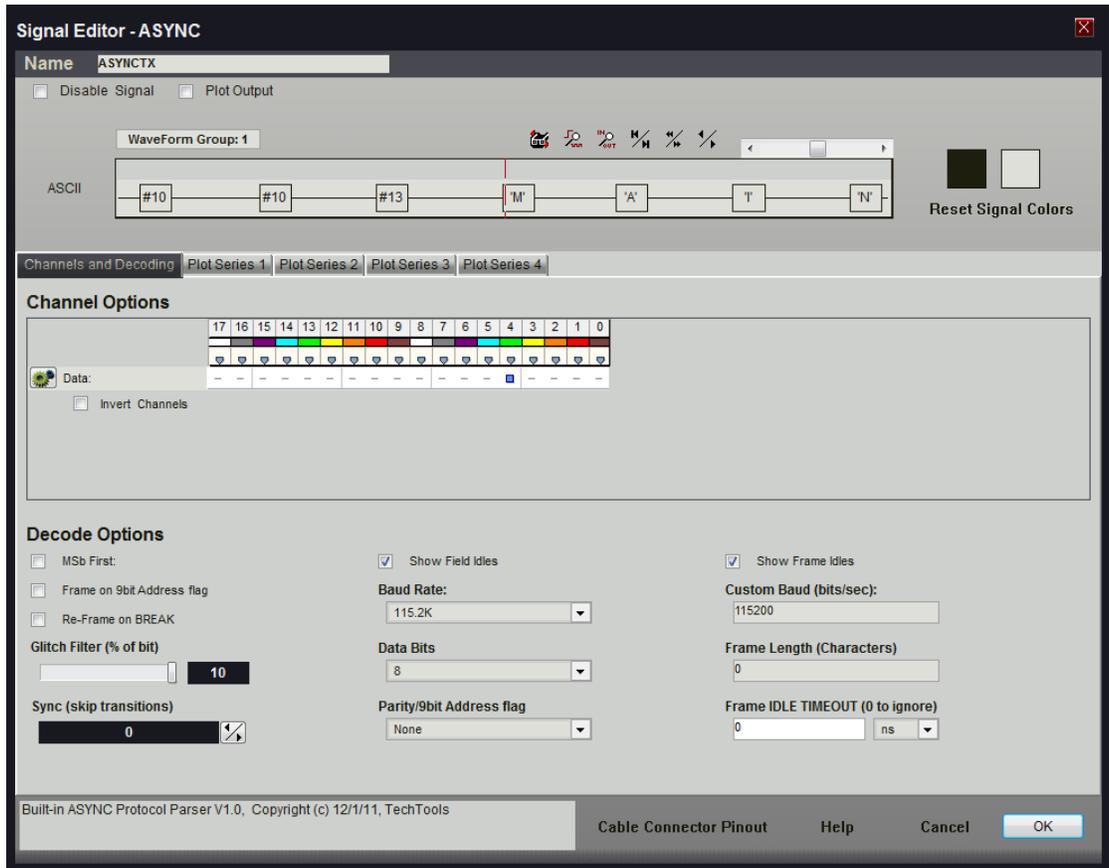
DigiView has a much higher bandwidth than most CAN receivers so it is capable of capturing glitches or noise pulses that normal receivers might not even see. Also, many CAN receivers have different levels of filtering available. This option lets you tell us how relatively good we should be at rejecting noise pulses. A setting of 0 tells us to process full bandwidth data with poor rejection. Increasing this setting makes us simulate higher immunity parts. Selection range is from 0% to 10%.

**Plot Series 1 - 4**

If "Plot Output" is selected, up to 4 plots can be defined. If enabled and at least one Plot Series is defined, all waveform views will display the data in a plotted format. (see: [Plotting Signal Data](#) <sup>(61)</sup>).

3.2.1.1.4 Asynchronous

Use the Asynchronous Signal type to see the capture from a single channel decoded and displayed as serial characters or frames of characters with a specific bit count and baud rate.



**Signal Name**

Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, Searches, Tabular Views, Exports, Trigger Configurations and all menu references.

**Disable Signal**

Check this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable capture space.

**Plot Output**

Check this item to enable Plotting for this signal. If checked, all waveform views will display plotted data as defined by the Plot Series configurations. You must enable and configure at least one Plot Series before any plotted data is visible. Up to 4 individual plots can be configured for each signal. (see: [Plotting Signal Data](#)<sup>[61]</sup>).

### Color Selection & Examples

An example of the signal is displayed in the current color scheme, followed by an example of the current color selections for this signal and a color reset button. Clicking on one of the color squares will open the [Color Selection](#)<sup>[112]</sup> dialog to change the Signal line color and its background color if a color other than the theme color is desired.

### Reset Signal Colors

This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)<sup>[100]</sup>).

### Channel Options

This is where you will associate a signal definition with the physical channels or connections to the outside world. Each signal definition type will have one or more channel selection groups and will allow one or more channels to be selected for each group. Each channel selection group will be identified on its left if more than one group is available for the signal type.

To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)<sup>[29]</sup>). Channels that are selected for this signal will replace the " - " with a blue square as shown above. The gray arrow beneath each channel color is an activity indicator that displays the activity of the channel as compared to the activity of all the other channels (relational, not real time).

### Data Channel Selection

Selects which physical channel to use for this serial bus.

#### *Invert Channels*

If selected, the captured data for the selected channel will be inverted before decoding and displaying (only affects this Signal Definition).

### Baud Rate:

Selects from a list of standard BAUD rates or 'use custom'.

### Custom Baud (bits/sec):

The BAUD rate to use if BAUD RATE is set to 'use custom'.

### Data Bits

Selects the number of data bits in a character.

### Parity/9bit Address flag

Selects from odd,even,one,zero,non standard parity settings.  
Also allows selection of 9bit addressing mode with and address field flagged with a '1' or with a '0'.

### Glitch Filter (% of bit)

Select noise filter setting of none-10% of a bit width.

### Sync (skip transitions)

Specifies how many transitions to ignore at the start of the buffer.  
Useful for syncing up when capture starts mid-character.

### MSB First:

Specifies that bits are received in MSB first order (VERY rare).

**Frame Length (Characters)**

Number of characters in a frame. Set to 0 to disable.

**Frame IDLE TIMEOUT (0 to ignore):**

A new frame is started if no characters are seen for more than the specified time. Set to 0 to disable. This can be useful if there are none of the other frame methods apply, but you can see a consistent pause before each frame starts.

**Frame on 9bit Address flag**

Start a new frame when a 9bit address byte is detected (if parity set to 9bit mode).

**Re-Frame on BREAK**

Terminate and start a new frame when BREAK detected.

**Show Field Idles**

Specifies whether idle time between fields should be shown as a hashed field or if the current field should just extend to the next field.

**Show Frame Idles**

Specifies whether idle time between frames should be shown as a single center line or if the current frame should just extend to the start of the next frame.

**Plot Series 1 - 4**

If "Plot Output" is selected, up to 4 plots can be defined. If enabled and at least one Plot Series is defined, all waveform views will display the data in a plotted format. (see: [Plotting Signal Data](#)<sup>[61]</sup>).

**Display Fields****DATA**

Field type used for most characters. Shows the received data

**Address**

Field type used for 9 bit address bytes. Shows the received data

**BREAK**

Field type used for break events. Prints the word BREAK

**ParityError**

Field type used to display parity errors. Shows ' P '

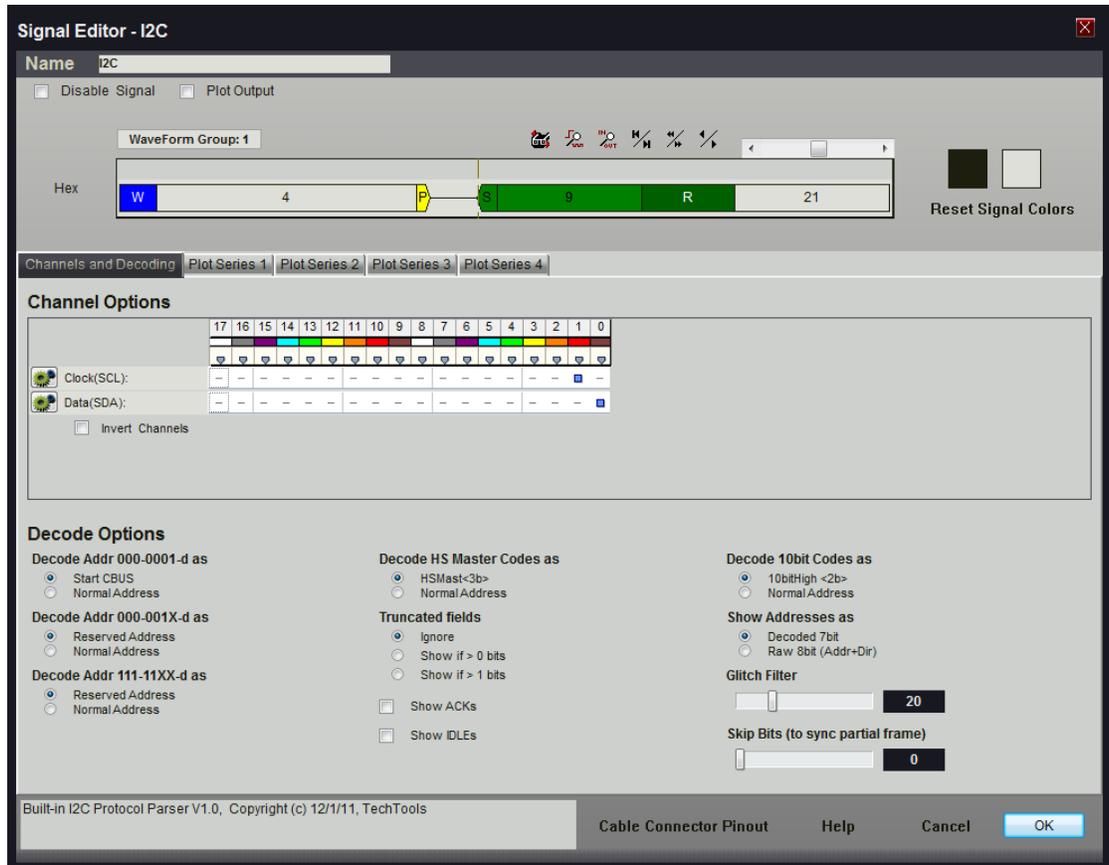
**FrameError**

Field type used to display character framing errors. Shows ' F '

**NOTE:** Multiple framing methods can be used at the same time. For example, you could use a frame length specifier and the frames will be broken into the specified lengths. If a timeout is specified, it will override and terminate a frame if the specified time is exceeded.

## 3.2.1.1.5 I2C

Use the I2C Signal type to decode two channels using the full I2C serial protocol.



### Signal Name

Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, Searches, Tabular Views, Exports, Trigger Configurations and all menu references.

### Disable Signal

Check this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable capture space.

### Plot Output

Check this item to enable Plotting for this signal. If checked, all waveform views will display plotted data as defined by the Plot Series configurations. You must enable and configure at least one Plot Series before any plotted data is visible. Up to 4 individual plots can be configured for each signal. (see: [Plotting Signal Data](#) <sup>[61]</sup>).

### Color Selection & Examples

An example of the signal is displayed in the current color scheme, followed by an example of

the current color selections for this signal and a color reset button. Clicking on one of the color squares will open the [Color Selection](#)<sup>[112]</sup> dialog to change the Signal line color and its background color if a color other than the theme color is desired.

### Reset Signal Colors

This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)<sup>[100]</sup>).

### Channel Options

This is where you will associate a signal definition with the physical channels or connections to the outside world. Each signal definition type will have one or more channel selection groups and will allow one or more channels to be selected for each group. Each channel selection group will be identified on its left if more than one group is available for the signal type.

To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)<sup>[29]</sup>). Channels that are selected for this signal will replace the " - " with a blue square as shown above. The gray arrow beneath each channel color is an activity indicator that displays the activity of the channel as compared to the activity of all the other channels (relational, not real time).

### Clock (SCL) Channel Selection

Selects which physical channel to assign to the CLOCK.

#### *Invert Channels*

If selected, the captured data for SCL will be inverted before decoding and displaying (only affects this Signal Definition).

### Data (SDA) Channel Selection

Selects which physical channel to assign to the DATA bus.

#### *Invert Channels*

If selected, the captured data for SDA will be inverted before decoding and displaying (only affects this Signal Definition).

### Glitch Filter

Selects the amount of noise filtering. Should be set to 50ns for low speed buses and reduces for FAST buses.

### Skip Bits (to sync partial frame)

Specifies how many bits to ignore at the start of the buffer. Useful for syncing up when capture starts mid-frame.

### Decode Addr 000-0001-d as

Selects between the standard I2C decoding for this address range or decoding it as normal 7 bit devices.

### Decode Addr 000-001X-d as

Selects between the standard I2C decoding for this address range or decoding it as normal 7 bit devices.

### Decode Addr 111-11XX-d as

Selects between the standard I2C decoding for this address range or decoding it as normal 7 bit devices.

**Decode HS Master Codes as**

Selects between the standard I2C decoding for this address range or decoding it as normal 7 bit devices.

**Decode 10bit Codes as**

Selects between the standard I2C decoding for this address range or decoding it as normal 7 bit devices.

**Truncated fields**

Specified whether to show truncated/partial fields or not. 1 bit truncated fields common and unavoidable so the options include showing only if > 1 bit.

**Show ACKs**

Selects whether to show ACKs in the waveforms, tables and searches NAKs are always shown.

**Show Addresses as**

The I2C spec defines 7 bit addresses and a 1 bit direction (R/W) in the first field. Sometimes it is convenient to think of this as a single 8 bit value. This option specifies whether to show as 2 fields (per spec.) or as a single 8 bit field.

**Show IDLEs**

Specifies whether idle time between fields should be shown as a hashed field or if the current field should just extend to the next field.

**Plot Series 1 - 4**

If "Plot Output" is selected, up to 4 plots can be defined. If enabled and at least one Plot Series is defined, all waveform views will display the data in a plotted format. (see: [Plotting Signal Data](#)<sup>(61)</sup>).

**Display Fields****Start**

Field type used to show start and repeated start event.  
Shows ' S ' for start or ' Sr ' for repeated start.

**Stop**

Field type used for stop events. Shows ' P '.

**Addr**

Field type used for normal 7bit address fields

**Addr8**

Field type used to show first byte as 8 bit address+direction

**Data**

Field type used for most characters. Shows the received byte

**Ack**

Field type used to show Acknowledge bit. Shows ' A '

**Nak**

Field type used to show Nak bits. Shows ' N '.

**WRITE**

Field type used to show WRITE bits. Shows ' W '.

**READ**

Field type used to show READ bits. Shows ' R '.

**General-Call**

Field type used to show first byte code is General-Call.  
Shows ' Gen-Call '.

**Start-Byte**

Field type used when the first byte code is START BYTE.  
Shows ' START '.

**HS Master**

Field type used when first byte code is High Speed Master.  
Shows ' HS Master: ' followed by the 3 bit master ID.

**CBUS**

Field type used when the first byte code is CBUS.  
Prints the word CBUS.

**Reserved**

Field type used when the first byte is a reserved address.  
Prints the word 'RESERVED: ' followed by the actual data.

**10bitMode**

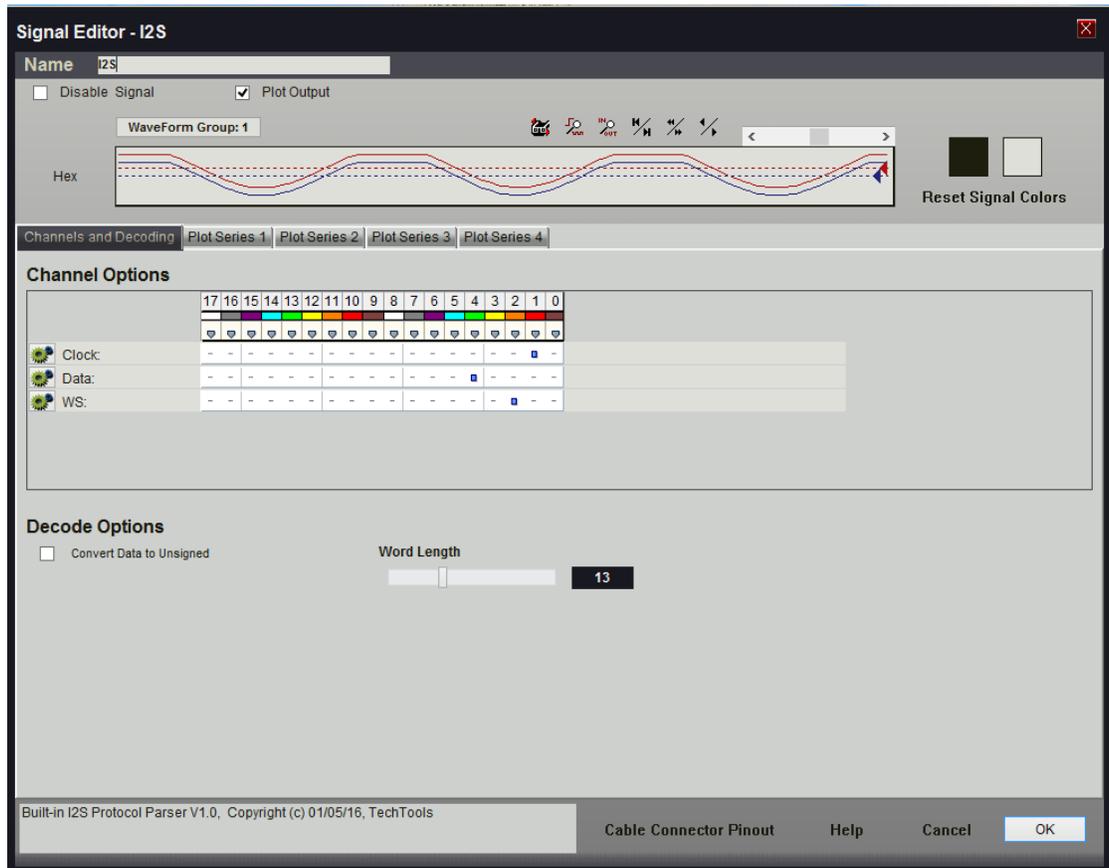
Field type used when the first byte code is 10 bit Mode.  
Prints ' 10bitMode: ' followed by the high 2 bits of the 10bit address.

**Truncated**

Field type used when a byte is truncated (by a stop or repeated start)  
Prints ' T: ' followed by the received data.

## 3.2.1.1.6 I2S

Use the I2S Signal type to decode three channels using the Inter-IC Sound bus protocol. The example below has been configured for Plotting (see: [Plotting Signal Data](#)<sup>[61]</sup>).



### Signal Name

Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, Searches, Tabular Views, Exports, Trigger Configurations and all menu references.

### Disable Signal

Check this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable capture space.

### Plot Output

Check this item to enable Plotting for this signal. If checked, all waveform views will display plotted data as defined by the Plot Series configurations. You must enable and configure at least one Plot Series before any plotted data is visible. Up to 4 individual plots can be configured for each signal. (see: [Plotting Signal Data](#)<sup>[61]</sup>).

### Color Selection & Examples

An example of the signal is displayed in the current color scheme, followed by an example of the current color selections for this signal and a color reset button. Clicking on one of the color squares will open the [Color Selection](#)<sup>[112]</sup> dialog to change the Signal line color and its background color if a color other than the theme color is desired.

### Reset Signal Colors

This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)<sup>[100]</sup>).

### Channel Options

This is where you will associate a signal definition with the physical channels or connections to the outside world. Each signal definition type will have one or more channel selection groups and will allow one or more channels to be selected for each group. Each channel selection group will be identified on its left if more than one group is available for the signal type.

To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)<sup>[29]</sup>). Channels that are selected for this signal will replace the " - " with a blue square as shown above. The gray arrow beneath each channel color is an activity indicator that displays the activity of the channel as compared to the activity of all the other channels (relational, not real time).

### Clock Channel Selection

Selects which physical channel to assign to the CLOCK.

#### *Invert Channels*

If selected, the captured data for CLOCK will be inverted before decoding and displaying (only affects this Signal Definition).

### Data Channel Selection

Selects which physical channel to assign to DATA.

#### *Invert Channels*

If selected, the captured data for DATA will be inverted before decoding and displaying (only affects this Signal Definition).

### WS Channel Selection

Selects the physical channel to use as the Word Select (WS). The word select determines whether the data is for the Left or Right audio channel.

#### *Invert Channels*

If selected, the captured data for WS will be inverted before decoding and displaying (only affects this Signal Definition).

### Convert Data to Unsigned

When selected, the data word will be converted from a signed value to an unsigned value before displaying or plotting.

### Word Length

Specifies how many bits to use for the data word. Selection range is from 4 to 32 bits.

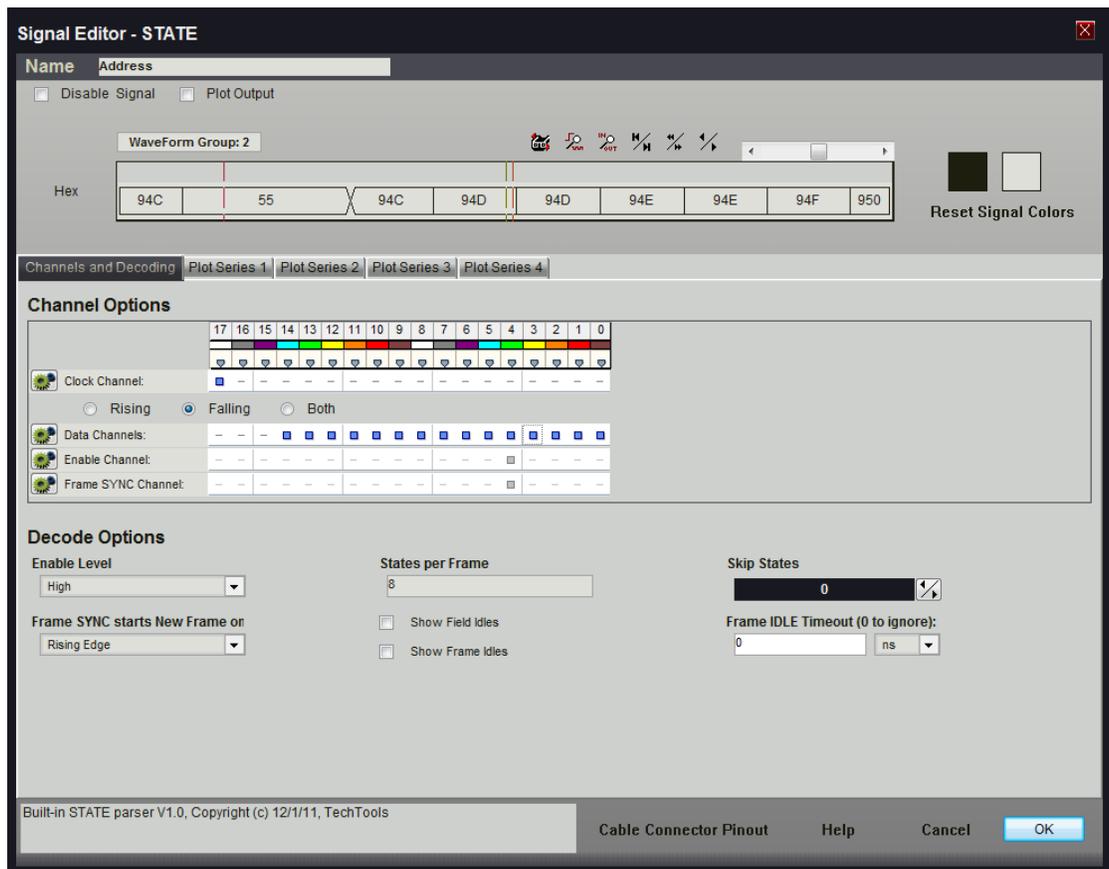
### Plot Series 1 - 4

If "Plot Output" is selected, up to 4 plots can be defined. If enabled and at least one Plot

Series is defined, all waveform views will display the data in a plotted format. (see: [Plotting Signal Data](#)<sup>[61]</sup>).

### 3.2.1.1.7 State

Use the State Signal type to see the data from one or more channels only when the state of another channel changes. This other channel will be used as a "state clock" and optionally the Clock can be qualified by the logic state of an additional channel (Enable). This signal type can be used to mask invalid data during bus transitional periods or the "noise" that occurs during unqualified periods, making it easier to analyze true data.



### Signal Name

Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, Searches, Tabular Views, Exports, Trigger Configurations and all menu references.

### Disable Signal

Check this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable capture space.

### Plot Output

Check this item to enable Plotting for this signal. If checked, all waveform views will display plotted data as defined by the Plot Series configurations. You must enable and configure at least one Plot Series before any plotted data is visible. Up to 4 individual plots can be configured for each signal. (see: [Plotting Signal Data](#)<sup>[61]</sup>).

### Color Selection & Examples

An example of the signal is displayed in the current color scheme, followed by an example of the current color selections for this signal and a color reset button. Clicking on one of the color squares will open the [Color Selection](#)<sup>[112]</sup> dialog to change the Signal line color and its background color if a color other than the theme color is desired.

### Reset Signal Colors

This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)<sup>[100]</sup>).

### Channel Options

This is where you will associate a signal definition with the physical channels or connections to the outside world. Each signal definition type will have one or more channel selection groups and will allow one or more channels to be selected for each group. Each channel selection group will be identified on its left if more than one group is available for the signal type.

To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)<sup>[29]</sup>). Channels that are selected for this signal will replace the " - " with a blue square as shown above. The gray arrow beneath each channel color is an activity indicator that displays the activity of the channel as compared to the activity of all the other channels (relational, not real time).

### Clock Channel Selection

Selects which physical channel to assign to the CLOCK.

#### ***Rising, Falling, Both***

Select which edge of the Clock to use to strobe in the data.

### Data Channel Selection

Selects the physical channels to assign to the DATA bus.

#### ***Select All, Select One***

Shortcut buttons to select all the channels or to select just one.

### Enable Channel Selection

Selects which physical channel to assign to the ENABLE. The enable can be disabled if not used.

#### ***Disable / Ignore***

If selected, the ENABLE channel will be ignored when decoding this signal.

### Frame SYNC Channel Selection

Selects which physical channel to assign to the FRAME SYNC. This can be used to identify frame limits. The FRAME SYNC can be disabled if not used.

#### ***Disable / Ignore***

If selected, the FRAME SYNC channel will be ignored when decoding this signal.

**Enable Level**

Selects the active level for the Enable signal.

**Skip States**

Specifies how many states to ignore before starting a frame. Useful for syncing up data that has no framing signals.

**States per Frame**

Specifies how many states are in a frame (if fixed). Set to 0 to ignore if other framing methods are being used.

**Frame SYNC starts New Frame on:**

Specifies how the Frame Sync signal is used (if enabled). Rising, Falling and Either edges specify what starts a new frame (and terminates the previous frame). The last two options specify that one edge starts a frame and the other edge terminates the frame. Any startframe will automatically end the previous frame. Specifying the endframe just ends it earlier for aesthetics.

**Frame IDLE Timeout (0 to ignore):**

A new frame is started if no new states are seen for more than the specified time. Set to 0 to disable. This can be useful if there are no sync lines or field counts but you can see a consistent pause before each frame starts.

**Show Field Idles**

Specifies whether idle time between fields should be shown as a hashed field or if the current field should just extend to the next field.

**Show Frame Idles**

Specifies whether idle time between frames should be shown as a single center line or if the current frame should just extend to the start of the next frame.

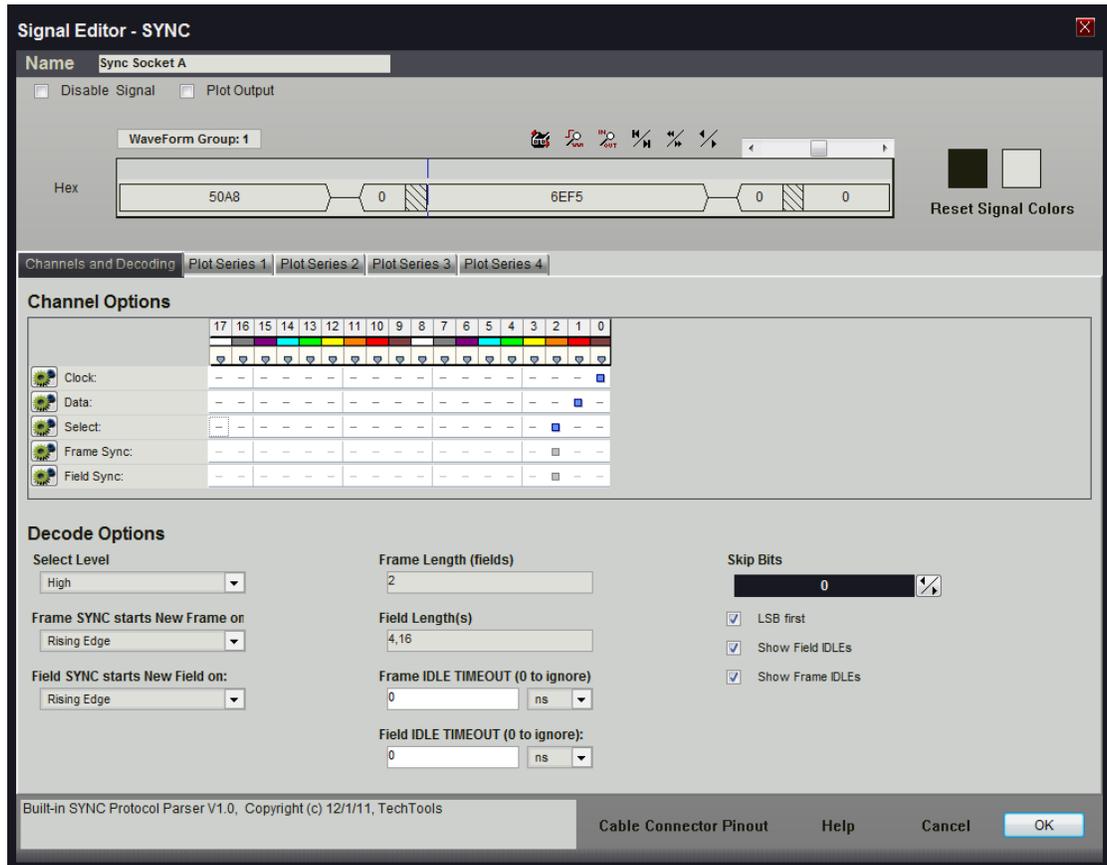
**Plot Series 1 - 4**

If "Plot Output" is selected, up to 4 plots can be defined. If enabled and at least one Plot Series is defined, all waveform views will display the data in a plotted format. (see: [Plotting Signal Data](#)<sup>[61]</sup>).

**NOTE:** Multiple framing methods can be used at the same time. For example, you could use a frame length specifier and the frames will be broken into the specified lengths. If a timeout is specified, it will override and terminate a frame if the specified time is exceeded.

3.2.1.1.8 Synchronous

Use the Synchronous Signal type to see the data from a single channel decoded as a field of data or framed fields of data by using another channel as the bit clock. Optionally you can use the "Select" channel to qualify the clock.



**Signal Name**

Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, Searches, Tabular Views, Exports, Trigger Configurations and all menu references.

**Disable Signal**

Check this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable capture space.

**Plot Output**

Check this item to enable Plotting for this signal. If checked, all waveform views will display plotted data as defined by the Plot Series configurations. You must enable and configure at least one Plot Series before any plotted data is visible. Up to 4 individual plots can be configured for each signal. (see: [Plotting Signal Data](#)<sup>[61]</sup>).

### Color Selection & Examples

An example of the signal is displayed in the current color scheme, followed by an example of the current color selections for this signal and a color reset button. Clicking on one of the color squares will open the [Color Selection](#)<sup>[112]</sup> dialog to change the Signal line color and its background color if a color other than the theme color is desired.

### Reset Signal Colors

This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)<sup>[100]</sup>).

### Channel Options

This is where you will associate a signal definition with the physical channels or connections to the outside world. Each signal definition type will have one or more channel selection groups and will allow one or more channels to be selected for each group. Each channel selection group will be identified on its left if more than one group is available for the signal type.

To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)<sup>[29]</sup>). Channels that are selected for this signal will replace the " - " with a blue square as shown above. The gray arrow beneath each channel color is an activity indicator that displays the activity of the channel as compared to the activity of all the other channels (relational, not real time).

### Clock Channel Selection

Selects which physical channel to assign to the CLOCK.

#### *Rising, Falling, Both*

Select which edge of the Clock to use to strobe in the data.

### Data Channel Selection

Selects which physical channel to assign to the DATA bus.

#### *Invert Channels*

If selected, the captured data for the selected channel will be inverted before decoding and displaying (only affects this Signal Definition).

### Select Channel Selection

Selects which physical channel to assign to the ENABLE. The enable can be disabled if not used.

#### *Disable / Ignore*

If selected, the ENABLE channel will be ignored when decoding this signal.

### Frame SYNC Channel Selection

Selects which physical channel to assign to the FRAME SYNC. This can be used to identify frame limits. The FRAME SYNC can be disabled if not used.

#### *Disable / Ignore*

If selected, the FRAME SYNC channel will be ignored when decoding this signal.

### Field SYNC Channel Selection

Selects which physical channel to assign to the FIELD SYNC. This can be used to identify field limits. The FIELD SYNC can be disabled if not used.

***Disable / Ignore***

If selected, the FIELD SYNC channel will be ignored when decoding this signal.

**Select Level**

Selects the active level for the Select signal.

**LSB first**

Selects LSB (Least significant bit) first.

**Frame Length (fields)**

Specifies how many fields are in a frame.  
Set to 0 to disable this method of framing.

**Field Length(s)**

Specifies a list of comma separated field lengths (in bits).  
The first number is the length of the first field, the second number is the 2nd field and so forth. Set to 0 to disable this method of framing.

**Frame SYNC starts New Frame on:**

Specifies how the Frame Sync signal is used (if enabled). Rising, Falling and Either edges specify what starts a new frame (and terminates the previous frame). The last two options specify that one edge starts a frame and the other edge terminates the frame. Any startframe will automatically end the previous frame. Specifying the endframe just ends it earlier for aesthetics.

**Field SYNC starts New Field on:**

Specifies how the Field Sync signal is used (if enabled). Rising, Falling and Either edges specify what starts a new frame (and terminates the previous frame) The last two options specify that one edge starts a field and the other edge terminates it. Any startfield or start frame will automatically end the previous field. Specifying the endfield just ends it earlier for aesthetics.

**Frame IDLE TIMEOUT (0 to ignore):**

A new frame is started if no new bits are seen for more than the specified time. Set to 0 to disable. This can be useful if there are no sync lines or field counts but you can see a consistent pause before each frame starts.

**Field IDLE TIMEOUT (0 to ignore):**

A new frame is started if no new bits are seen for more than the specified time. Set to 0 to disable. This can be useful if there are no sync lines or field counts but you can see a consistent pause before each frame starts.

**Skip Bits**

Specifies how many bits to ignore at the start of the buffer. Useful for syncing up when capture starts mid-field

**Show Field IDLEs**

Specifies whether idle time between fields should be shown as a hashed field or if the current field should just extend to the next field.

**Show Frame IDLEs**

Specifies whether idle time between frames should be shown as a single center line or if the current frame should just extend to the start of the next frame.

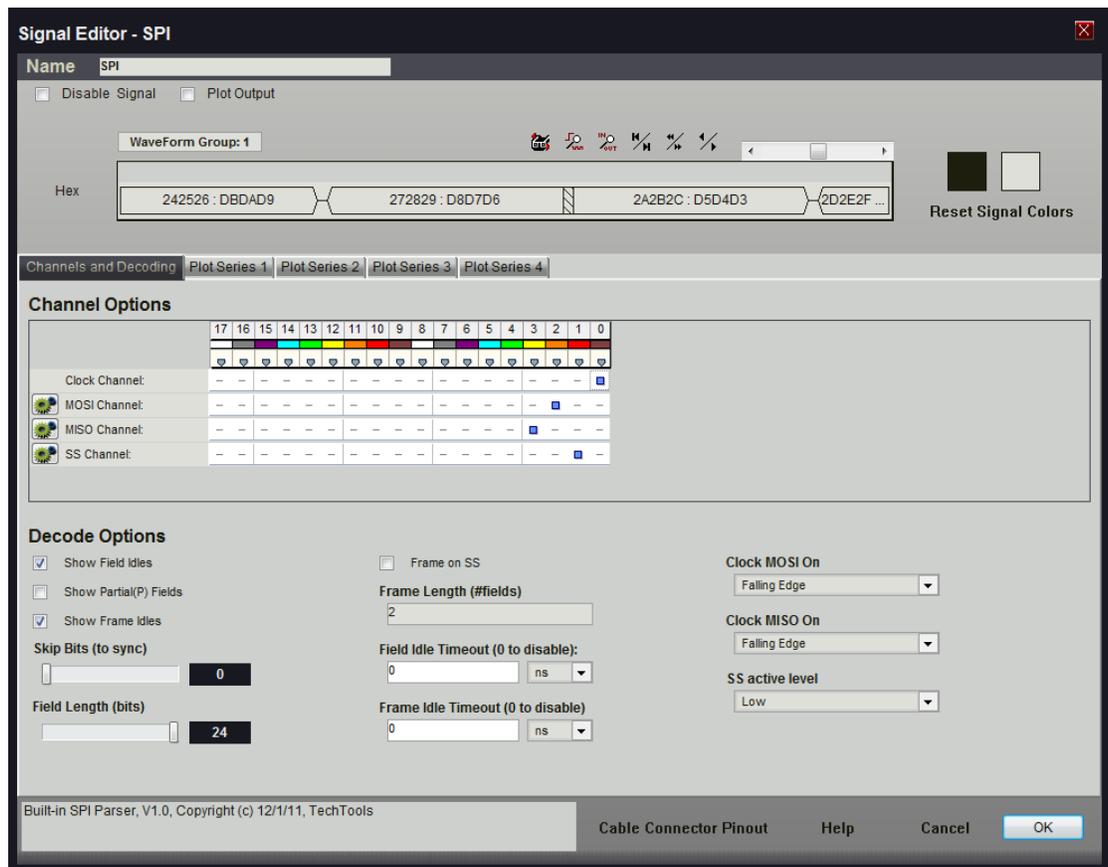
### Plot Series 1 - 4

If "Plot Output" is selected, up to 4 plots can be defined. If enabled and at least one Plot Series is defined, all waveform views will display the data in a plotted format. (see: [Plotting Signal Data](#)<sup>[61]</sup>).

**NOTE:** Multiple framing methods can be used at the same time. For example, you could use a frame length specifier and the frames will be broken into the specified lengths. If a timeout is specified, it will override and terminate a frame if the specified time is exceeded.

#### 3.2.1.1.9 SPI Signal Properties

Use the SPI Signal type to see the Master/Slave data from two Synchronous Serial data channels using the SPI protocol.



### Signal Name

Change the text displayed here to help you identify this signal definition. If the name has already been used, it will automatically be appended with a numerical value in brackets (i.e. [2]). The name displayed here will be used in the Waveform Views, Searches, Tabular Views, Exports, Trigger Configurations and all menu references.

### Disable Signal

Check this item to completely disable the Signal Definition. It is recommended to disable any signals that use channels that are not connected to a physical device. When a capture takes place ("Run"), any channels that are assigned to disabled signals will be ignored instead of using valuable capture space.

### Plot Output

Check this item to enable Plotting for this signal. If checked, all waveform views will display plotted data as defined by the Plot Series configurations. You must enable and configure at least one Plot Series before any plotted data is visible. Up to 4 individual plots can be configured for each signal. (see: [Plotting Signal Data](#)<sup>[61]</sup>).

### Color Selection & Examples

An example of the signal is displayed in the current color scheme, followed by an example of the current color selections for this signal and a color reset button. Clicking on one of the color squares will open the [Color Selection](#)<sup>[112]</sup> dialog to change the Signal line color and its background color if a color other than the theme color is desired.

### Reset Signal Colors

This button will reset the colors for this signal so that they will match the currently selected color theme (see: [Color Themes](#)<sup>[100]</sup>).

### Channel Options

This is where you will associate a signal definition with the physical channels or connections to the outside world. Each signal definition type will have one or more channel selection groups and will allow one or more channels to be selected for each group. Each channel selection group will be identified on its left if more than one group is available for the signal type.

To select a channel, click on the " - " below the proper color (and channel number) that corresponds to the physical connection of the DigiView Cable (see: [Connecting the Data Lines](#)<sup>[29]</sup>). Channels that are selected for this signal will replace the " - " with a blue square as shown above. The gray arrow beneath each channel color is an activity indicator that displays the activity of the channel as compared to the activity of all the other channels (relational, not real time).

### Clock Channel Selection

Selects which physical channel to assign to the CLOCK.

### MOSI Channel Selection

Selects which physical channel to assign to the MOSI data.

#### *Invert Channels*

If selected, the captured data for MOSI will be inverted before decoding and displaying (only affects this Signal Definition).

### MISO Channel Selection

Selects which physical channel to assign to the MISO data.

#### *Invert Channels*

If selected, the captured data for MISO will be inverted before decoding and displaying (only affects this Signal Definition).

### SS Channel Selection

Selects which physical channel to assign to SS (slave select).

***Disable / Ignore***

If selected, the SS channel will be ignored when decoding this signal.

***Invert Channels***

If selected, the captured data for the SS channel will be inverted before decoding and displaying (only affects this Signal Definition).

**Clock MOSI On**

Specifies which clock edge to use to strobe in MOSI data.

**Clock MISO On**

Specifies which clock edge to use to strobe in MISO data.

**SS active level**

Specifies the active level for the SS (slave select) signal.

**Field Idle Timeout (0 to disable)**

A new field is started if no new bits are seen for more than the specified time. Set to 0 to disable.

**Skip Bits (to sync)**

Specifies how many bits to ignore at the start of the buffer. Useful for syncing up when capture starts mid-field

**Field Length (bits)**

Specifies the data field length from 4 to 24 bits.

**Show Field Idles**

Specifies whether idle time between fields should be shown as a hashed field or if the current field should just extend to the next field.

**Show Partial(P) Fields**

Specifies whether to show partial fields or not. Partial fields were terminated (by timeout or SS) before they gathered the full bit count.

**Show Frame Idles**

Specifies whether idle time between frames should be shown as a single center line or if the current frame should just extend to the start of the next frame.

**Frame Length (#fields)**

Specifies the number of fields to include in a frame (if fixed length).  
Set to 0 to disable.

**Frame Idle Timeout (0 to disable)**

A new frame is started if no new bits are seen for more than the specified time. Set to 0 to disable. This can be useful if there are no sync lines or field counts but you can see a consistent pause before each frame starts.

**Frame on SS**

Specifies that we should terminate a frame on SS disable edges and start a new frame on SS active edges.

**Plot Series 1 - 4**

If "Plot Output" is selected, up to 4 plots can be defined. If enabled and at least one Plot

Series is defined, all waveform views will display the data in a plotted format. (see: [Plotting Signal Data](#)<sup>61</sup>).

### Display Fields

#### MOSI-MISO

Field type used to show normal data.

Shows the both data channels, separated by a colon: ' MOSI : MISO '

#### (P)MOSI-MISO

Field type used to show partial (interrupted) data fields.

Shows '(P)' followed by both data channels, separated by a colon: ' (P)MOSI : MISO '.

**NOTE:** Multiple framing methods can be used at the same time. For example, you could use a frame length specifier and the frames will be broken into the specified lengths. If a timeout is specified, it will override and terminate a frame if the specified time is exceeded.

### 3.2.1.2 Plotting Signal Data

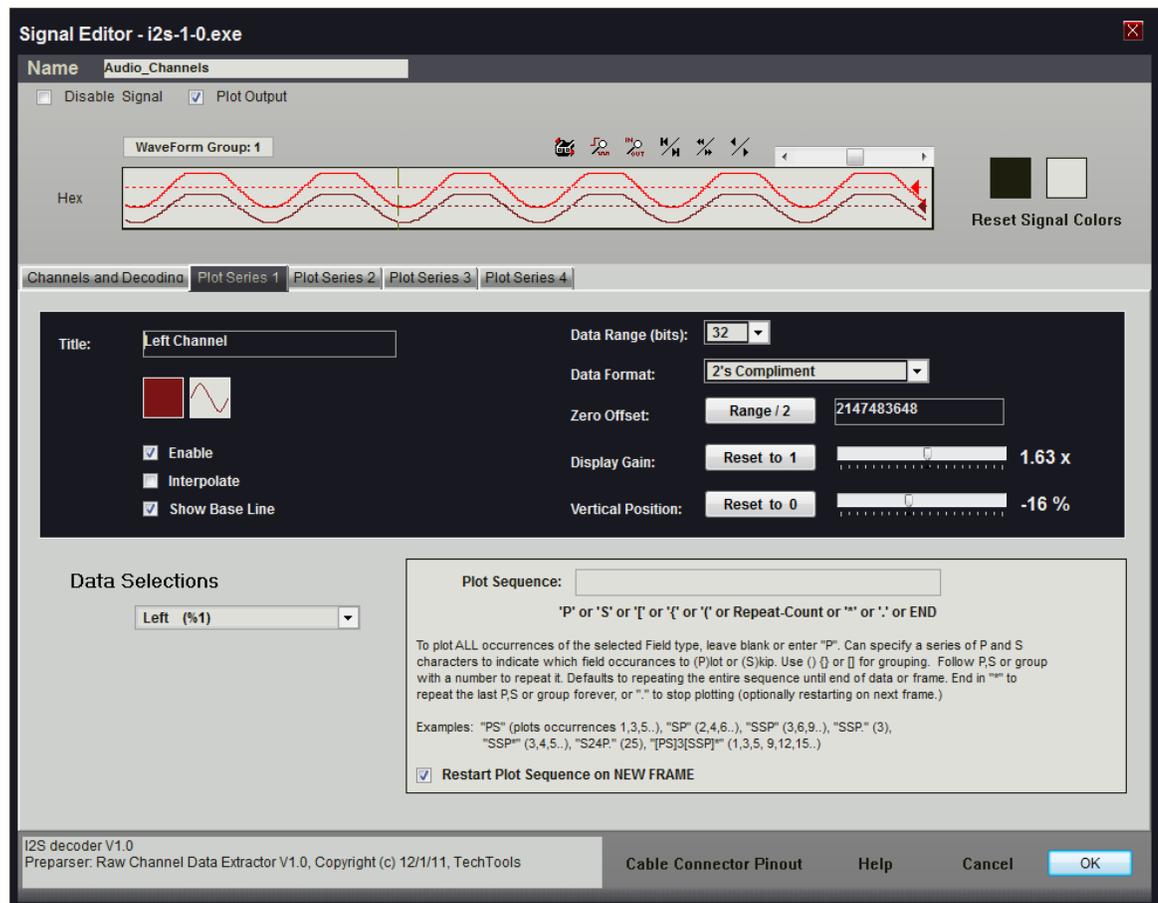
[Signal Definitions](#)<sup>[31]</sup> can be configured to plot the data when displayed in any Waveform View. Enabling Plot Output will not affect the data displayed in Tabular views or searched by [Pattern Search](#)<sup>[178]</sup> and [Sequential Search](#)<sup>[173]</sup> definitions.

Plotting can be configured for a specific field and field slice if the signal has field names. If only a particular sequence of the data to plot is required, this can be specified by using the single characters of P or S for Plot and Skip sequences, numbers for repeat counts and brackets for grouping any of the previous. Grouping and repeat counts can be nested up to 8 levels deep, giving you the ability to plot a wide range of custom data sequences.

Since the waveform representation of Boolean signals is already a plot of the 2 available states (1 or 0), no additional plotting options are available. All data of a Bus signal will be plotted within the Data Range selected and since they do not have any framing or field data, only one plot is available.

All other signal definitions (including those based on custom plug-ins) can each be configured for 4 unique plots.

#### Plot configuration example using the i2s signal



#### Title

Enter any Alphanumeric identifier. This identifier will display in the Marker column to identify

which plot is active for the on screen controls and Instant Measurements. Quick Measurements and Measurement windows use a shorthand identifier of S1, S2, S3 or S4 to refer to the Active Plot (meaning Series 1-4).

### Color Sample

Click on the solid color sample to customize the plot color [using the Color Selector](#)<sup>[112]</sup>.

### Enable

Toggles the plot series on/off.

### Interpolate

Click to enable or disable interpolation of the plot output.

### Show Base Line

Click to enable or disable drawing a dashed line representing the base line of the data.

### Data Range (bits)

Select the number of bits to use out of the total bit range of the plotted data. The selection is from 1 to 32 bits. Selecting a smaller value than the total available will truncate the value and discard the upper bits. This may be desirable if the upper bits are unused and has the effect of a coarse gain.

### Data Format

This tells DigiView how to interpret the data and could be called "treat data as...". Selections are:

- Unsigned
- 2's Compliment
- Sign & Magnitude
- Zero Offset

### Zero Offset

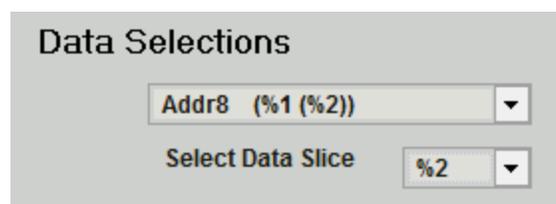
This value is ignored unless Zero Offset is chosen for the Data Format. Enter a decimal value within the data range that represents the zero point of the data. Use the button "Range / 2" to set this value to the middle of the range.

### Display Gain

Adjust the gain of the plot value for display purposes. This can also be adjusted in waveform views by dragging the plot handle left and right. Use the "Reset to 1" button to reset the gain to a 1:1 ratio (no gain).

### Vertical Position

Adjust the vertical location of the plot in the waveform area. This can also be adjusted in the waveform area by dragging the Plot Handle up and down.



### Data Selections

If a selection list is visible, the signal has more than one type of data field. Use the pull down to select which data field to plot.

### Select Data Slice

If Select Data Slice is visible, the selected field represents multiple data slices (indicated by %1, %2 etc). Select which slice of this field to plot by selecting one from the pull down.

Plot Sequence:

**Open Group. Expecting: ')' or 'P' or 'S' or '[' or '{' or '(' or Repeat-Count**

To plot ALL occurrences of the selected Field type, leave blank or enter "P". Can specify a series of P and S characters to indicate which field occurrences to (P)lot or (S)kip. Use () {} or [] for grouping. Follow P,S or group with a number to repeat it. Defaults to repeating the entire sequence until end of data or frame. End in "\*" to repeat the last P,S or group forever, or "." to stop plotting (optionally restarting on next frame.)

Examples: "PS" (plots occurrences 1,3,5..), "SP" (2,4,6..), "SSP" (3,6,9..), "SSP." (3), "SSP\*" (3,4,5..), "S24P." (25), "[PS]3[SSP]\*" (1,3,5, 9,12,15..)

Restart Plot Sequence on NEW FRAME

### Plot Sequence Editor

Leave this edit box blank to plot all occurrences of the selected field (or field slice). To define a pattern of field occurrences or skip specific fields in a sequence, enter the plotting sequence in this editing area.

The sequence specifiers are compiled for fast processing of the plot data. As you edit the sequence, the plot compiler displays "helper hints" beneath the edit box showing any errors or the next expected character(s).

P	Plot Field
S	Skip Field
(	Open a group - must use a ')' to close
[	Open a group - must use a ']' to close
{	Open a group - must use a '}' to close
Number	1-999 - Use a number to repeat the last item x number of times. If placed after closing a group, the entire group is repeated
*	Asterisk - repeat preceding item or group forever or only until the next frame if "Restart on New Frame" is selected.
.	Period - End the sequence. If end not specified the default behavior is to repeat the entire sequence.
)	Close a group - must use a '(' to open
]	Close a group - must use a '[' to open
}	Close a group - must use a '{' to open

Using '(', '{' or '[' to group sequences is a personal preference as all are equivalent. However, the proper closing must be used as documented above. In the graphic above the helper hint indicates that a group has not been closed and the compiler is expecting a ')' to close it. The hint also indicates that it is completely valid to open another group using any of the group specifiers, continue adding sequence characters or enter a repeat count.

#### Editor Examples

PS - plot all odd occurrences (1, 3, 5, 7, etc).

- SP - plot all even occurrences (2, 4, 6, 8, etc).
- SSP - skip two fields then plot the next one and repeats (plots every third field).
- SSP. - skip two fields then plot the third one and stop.
- SSP\* - skip two fields then plot the third one and every field after.
- S24P. - skip 24 fields then plot then next one and stop (only plots the 25th field).
- [PS]3[SSP]\* - plot the first 3 even fields (repeats Plot, Skip three times) then plot every third field thereafter (repeats skipping two fields and plotting the third one).

### Restart Plot Sequence on NEW FRAME

When not selected, framing information is ignored and the sequence will be processed until the end of data or the sequence ends. If selected and framing is configured for the signal definition, the specified sequence will restart at the beginning of a frame even if the sequence had not completed in the last frame. If no framing information is present, processing is the same as if the option is not selected.

## 3.2.2 Triggers

You can define a TRIGGER condition. When the hardware detects this condition, it will 'TRIGGER' the logic analyzer. When the sample buffer fills (or you manually STOP it), the data is transferred to the PC. The software on the PC then displays the data to you.

The trigger point is centered on the screen and is always TIME 0. All data prior to the trigger is negative time and all data after the trigger is positive time. If you stop the analyzer before a trigger condition is detected, the approximate center of the collected sample buffer is considered the trigger and the end of the data is the point where the hardware sampling was manually stopped.

**In our DigiView Software, triggers are specified in terms of SIGNALS. After assigning channels to signal names, you can configure the trigger condition based on the defined signals (see: [Signals](#)<sup>[31]</sup>). Most engineers will find it easier to reference the condition as it relates to the circuit's function rather than remembering which channels of the analyzer were used to connect to specific signals in the circuit.**

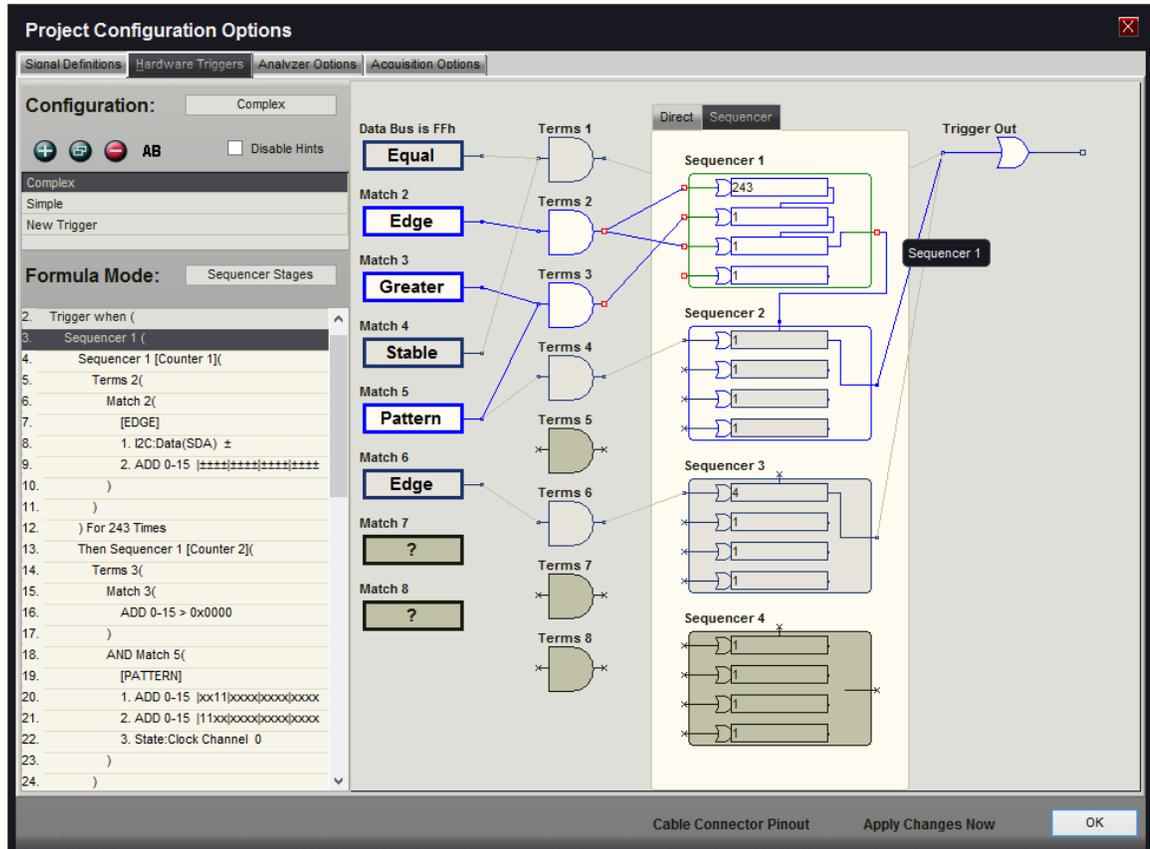
DigiView's new trigger configuration screen centers the user's focus on function; making it much easier to quickly analyze and modify a very complex trigger condition. The following graphic is an example of an advanced trigger condition for the DV3 series.

(see: [Trigger Configuration](#)<sup>[65]</sup>, [Trigger Match Types](#)<sup>[70]</sup>)



To access Trigger configuration options, click the Project Settings button on the tool bar, then select the Hardware Triggers tab.

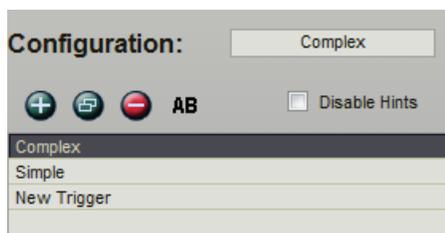
### Example of an Advanced Trigger Configuration for Model DV3500:



#### 3.2.2.1 Trigger Configuration

The Trigger Configuration Screen implements a dual-mode (GUI and text), schematic-like approach to configuring the matches, sequencers and trigger output from a single window. A text window shows the 'formula' for the configuration while the 'schematic' shows the flow. These two sections update together to provide two distinct views of the configuration. Multiple trigger configurations can also be selected and created using the selection area in the upper left corner of this screen.

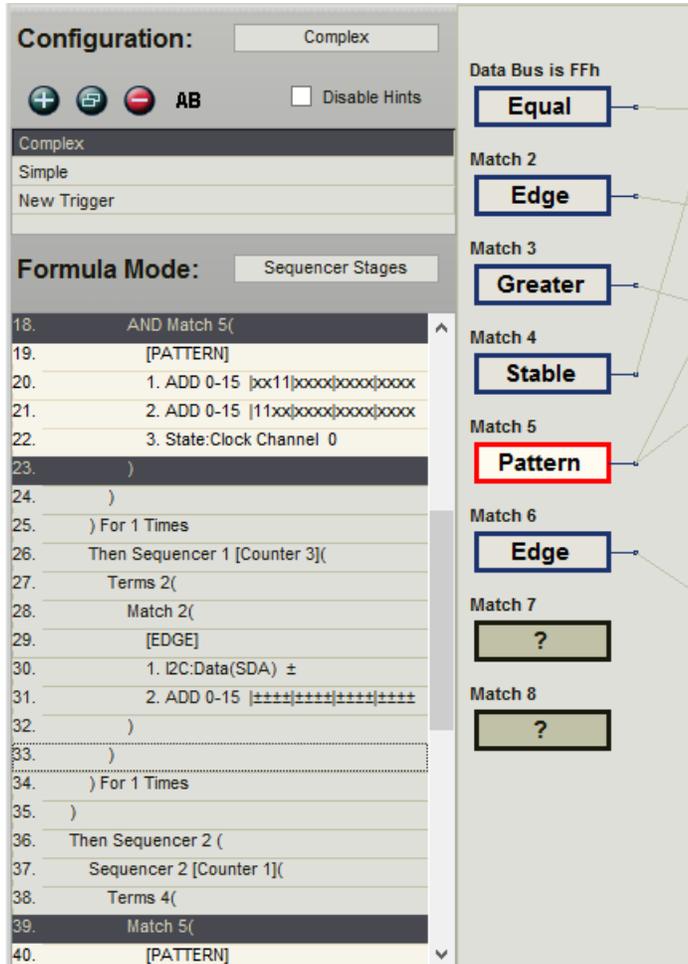
#### Trigger Configuration Selection



Multiple trigger configurations can be created and stored in the DigiView Data File. Use the

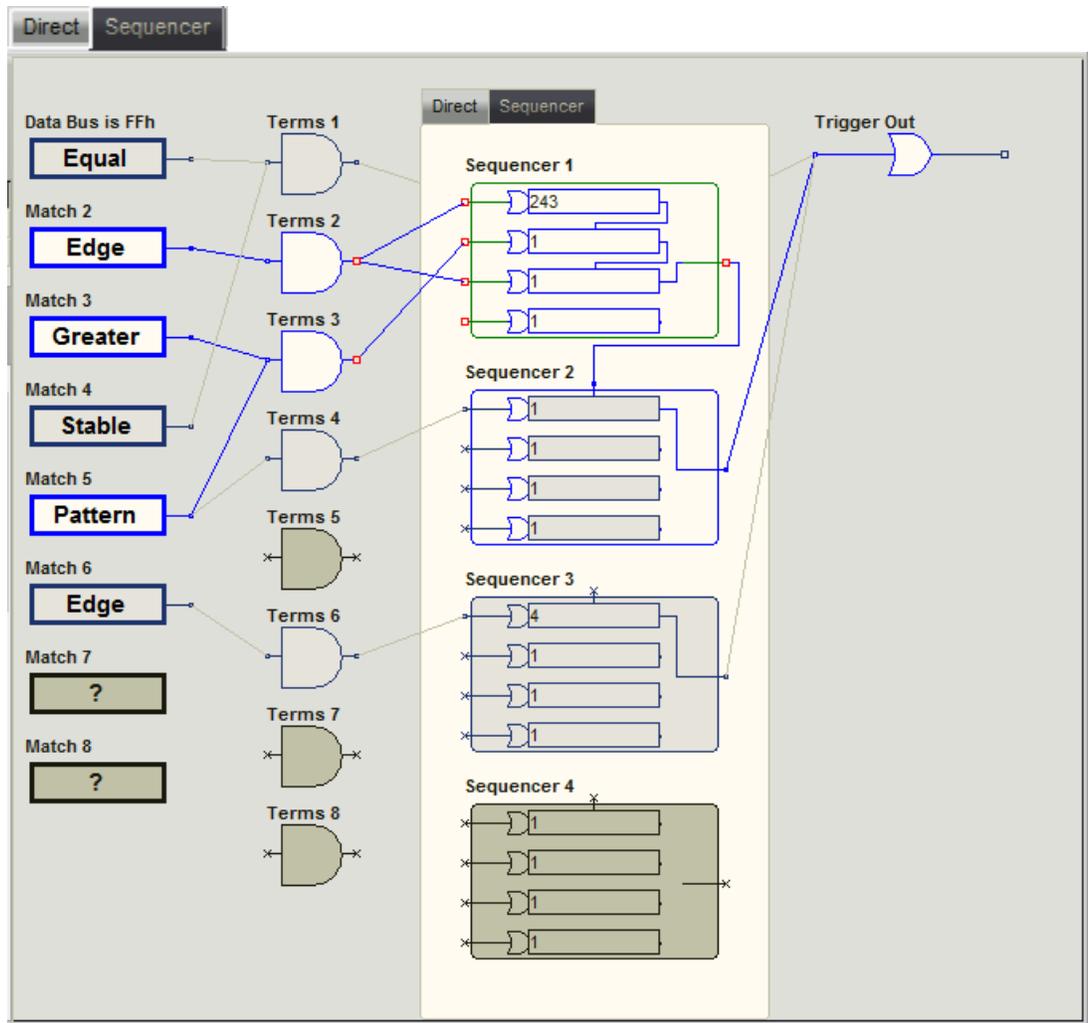
selection box to quickly chose another trigger configuration. After making a selection, click the "apply" button on the bottom of the screen to send the new configuration to the analyzer. To create, clone, delete or rename a configuration use the buttons above the selection box.

**Trigger Formula (left portion of screen)**



The formula presents a summary of the complete configuration. Since this summary can be quite involved with a complex trigger condition, each section will "highlight" as items in the graphical section are selected or the mouse moves over them. The formula will automatically scroll to bring the highlighted section into view while working in the graphical area of the configuration. In the image above, the summary of "MATCH 5" is brought into view as Match 5 is selected (shown with a red outline above).

## Schematic (right portion of screen)



This area is where the actual configuration is accomplished. For clarification, the graphical area is divided by two major paths: Direct (non-sequenced) pathways and Sequenced pathways. Select viewing of each path by using the appropriate Tab at the top of this area. Note: The Match configuration and Term connections are common to both pathways and will always display.

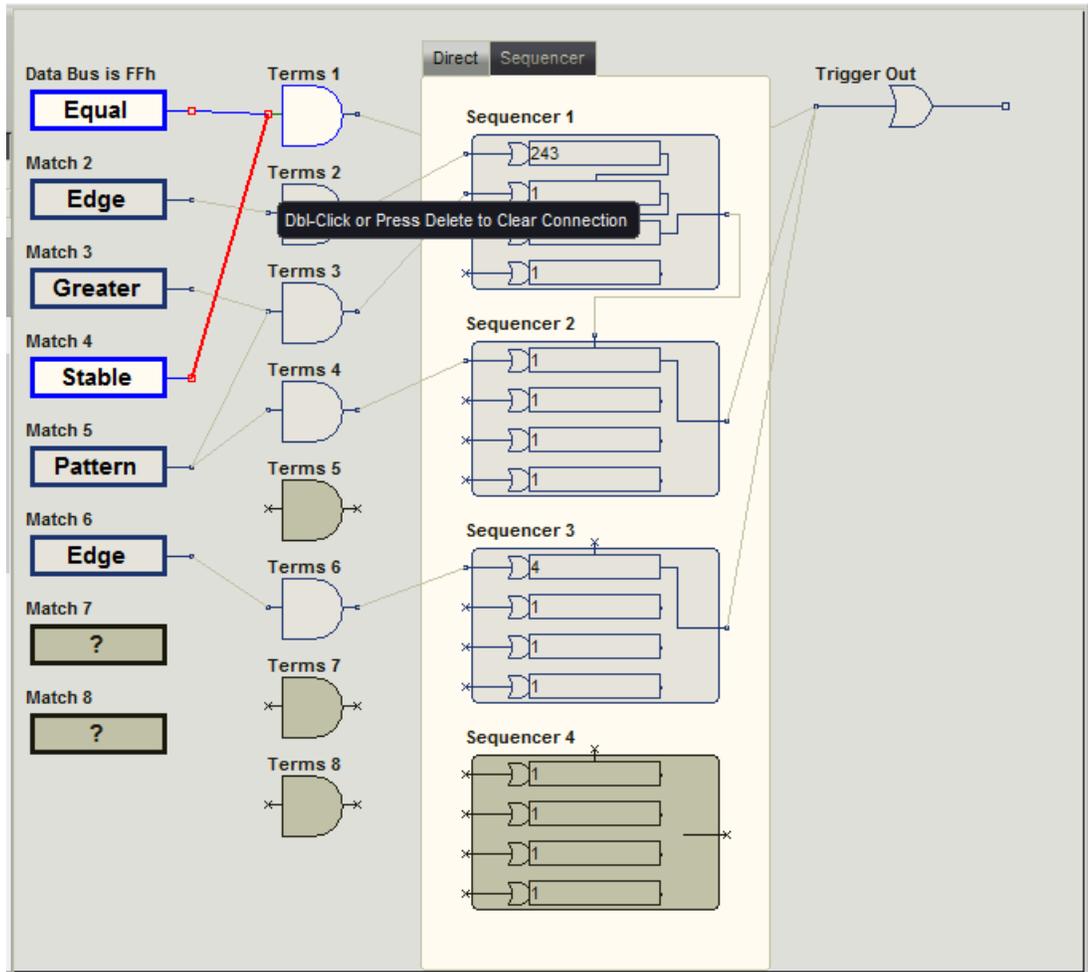
Every trigger configuration starts with a match condition and ends with Trigger Out, so the work flow is designed from left to right, starting with the Match Types (see: [Trigger Match Types](#)<sup>[70]</sup>).

## Connections

### Auto Connect

When the very first Match type is selected and the match condition has been specified, the match will automatically route graphically to the Trigger Out. For the DV3 series, this means it will route to TERMS 1, then the DIRECT (NON-Sequenced) option and then to Trigger Out.

This automatic function is only performed if no other connections already exist. Once you have started making connections for your trigger configuration, the software will not try to "guess" your intentions, since this would hinder your work. The software allows you to manually connect or disconnect if the action is valid. Only the obvious connect and disconnects will be performed automatically.



**Manual Connections**

Connection points will display a red square as the mouse moves over them. To **Start a connection** click on one of these points then move the mouse over another valid connection point and click to finish the connection. To **Delete a connection**, repeat the process or use the Delete Key or Double-Click when the connection highlights in the editing color (red). To **Cancel a connection** before the second point has been selected, click in the open area between valid connection points or use the Escape Key or the Delete Key.

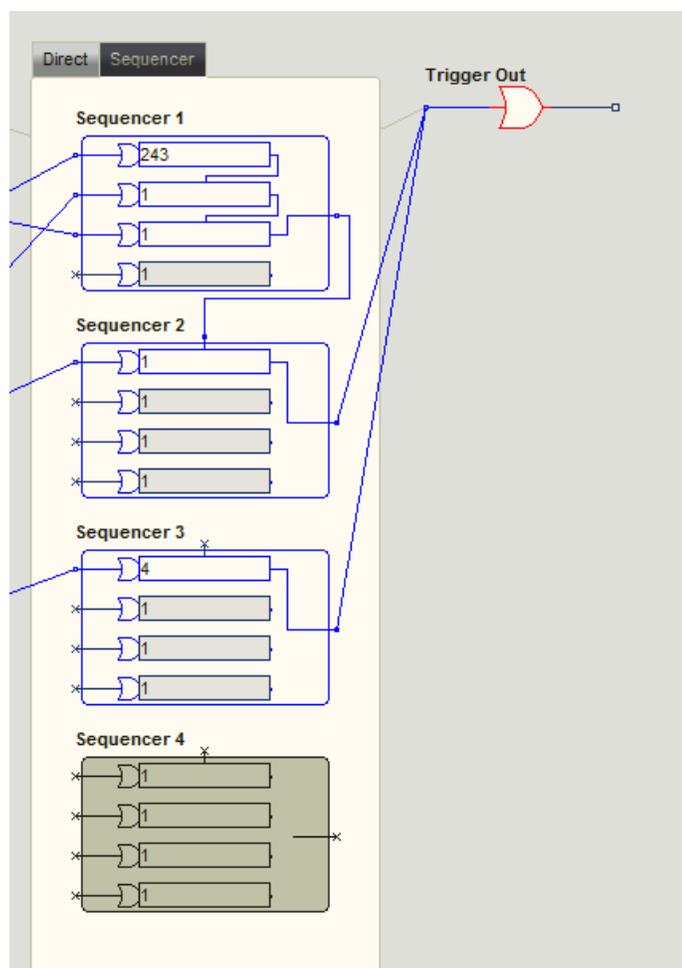
NOTE: The graphical connections in the trigger configuration directly correspond to the physical circuit connections in the hardware, making this screen an overview of the resulting logic in the analyzer's hardware.

See the Following Sections:

- [Trigger Match Types](#)<sup>[70]</sup>
- [Sequencer](#)<sup>[69]</sup>

### 3.2.2.2 Sequencer

The trigger circuit of the DV3 series includes 4 cascadable, 4 stage sequencers. These can be chained in any combination to produce longer sequences ( 1 @ 16 stages, 2 @ 8 stages...). Stage inputs are OR gates so that more than 1 term of match conditions can be connected to each stage. Each stage includes a 20 bit pass counter.

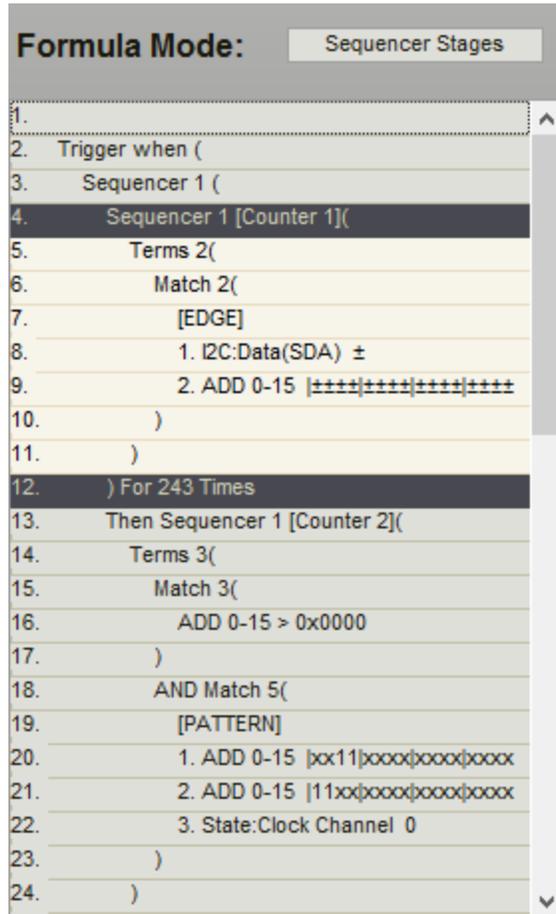


### Setting a Sequencer Counter

Double-Click in the counter to edit its value. When finished editing, either use the "Tab" key or click on another item to assign the new value to the configuration. Anytime the configuration changes, use the "APPLY" button to activate the new settings in the analyzer.

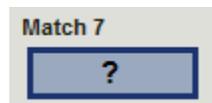
NOTE: "0" is an invalid value, so the counter editor will enforce a minimum count of "1".

Editing of a sequencer counter can also be activated by a Double-Click on the counter item in the Formula View. In the example below, a Double-Click on either of the darker lines will activate editing for Sequencer 1, Counter 1. The counter's current value is shown as 243 (the second darker line) and will update after editing is complete.



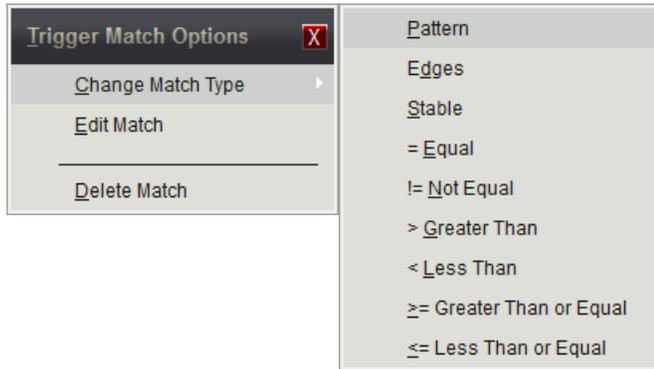
### 3.2.2.3 Trigger Match Types

The DigiView trigger configuration supports multiple types of Match conditions. The DV3 series of DigiView analyzers has a total of 8 configurable match circuits and each can be set to one of 9 different match types. Details of each match type can be found using the links below.



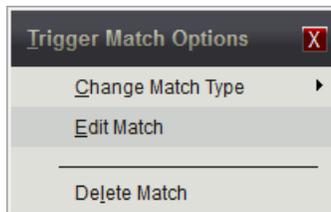
#### Setting the Match Type

A non-configured or "deleted" match will be identified by a "?" as seen above. To set the match type, simply click on the match (or Right-Click) and select the type from the menu that appears. If the match was configured previously (not cleared) then Right-Click to access this menu.



### Editing the Match Condition

When selecting or changing the match type, the editor for the match condition will automatically appear. To edit the condition later, simply Double-Click on the match or Right-Click on the match and choose "Edit" from the menu that appears.



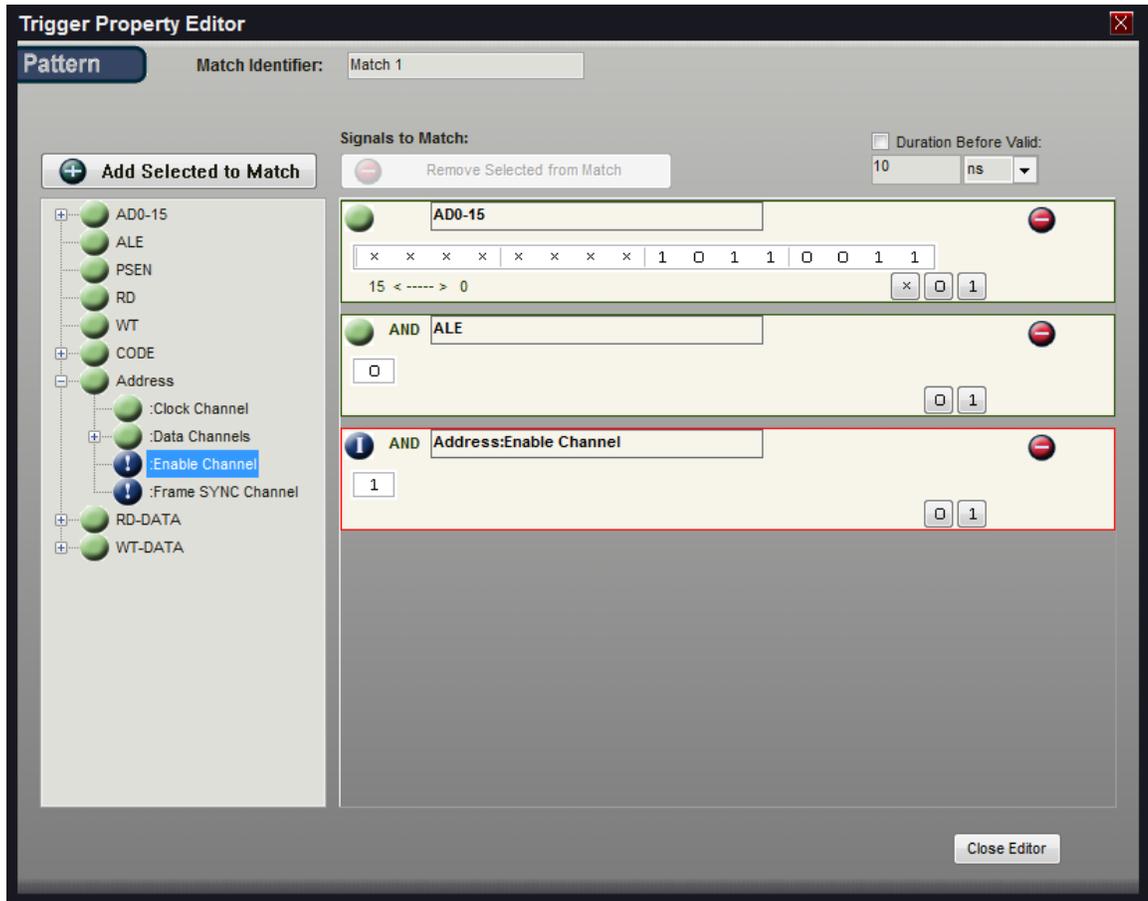
### Available Match Types:

- [Pattern](#) <sup>[72]</sup>
- [Edges](#) <sup>[73]</sup>
- [Stable](#) <sup>[75]</sup>
- [Equal](#) <sup>[76]</sup>
- [Not Equal](#) <sup>[78]</sup>
- [Greater Than](#) <sup>[80]</sup>
- [Greater Than or Equal](#) <sup>[82]</sup>
- [Less Than](#) <sup>[84]</sup>
- [Less Than or Equal](#) <sup>[86]</sup>

(See: [Trigger Configuration](#) <sup>[65]</sup>)

3.2.2.3.1 Pattern Match

The level trigger is a pattern match detector. You can configure it to match any combination of 0,1 or "don't cares" across all channels. The Pattern Match Editor is displayed below



**ADD a Signal** - Highlight a defined signal from the left portion of the window and click the "+" button to add it to the Pattern Match. You can also just "Double-Click" the defined signal to automatically add it. NOTE: High Level signal definitions (such as State, I2C, or etc) cannot be added directly as a complete signal. However, the individual portions of the signal (such as Enable above) can be added in the same manner. To see the sub-portions of a signal, click the "expand" button in the left column next to the signal's name, then add the sub portions in the same manner as any other signal.

For instance, if you have defined a State signal like the one above (Address) and you only want to add the Enable signal to the pattern match, then expand it and double-click on Enable.

**Note:** If a signal is valid for the trigger configuration, a green icon will be displayed next to it. Any other icon, such as the blue circle above on the Enable and the Frame Sync channel of the Address signal, indicates a channel state that is invalid for triggering. The Blue icon in the Edit area for Enable indicates the channel has been configured as 'Ignored' in the signal definition editor and is generally "Disabled" (Blue icon in the selection tree on the left). The Red outline in the edit area indicates an invalid signal has already been added to the definition, making it invalid. When moving the mouse over an invalid signal match, a hint will

display with additional details of the error.

**Delete a Signal** - Highlight a signal in the right portion of the window (or mouse-over its bit selections) and click the "-" button to delete it from the Pattern Match.

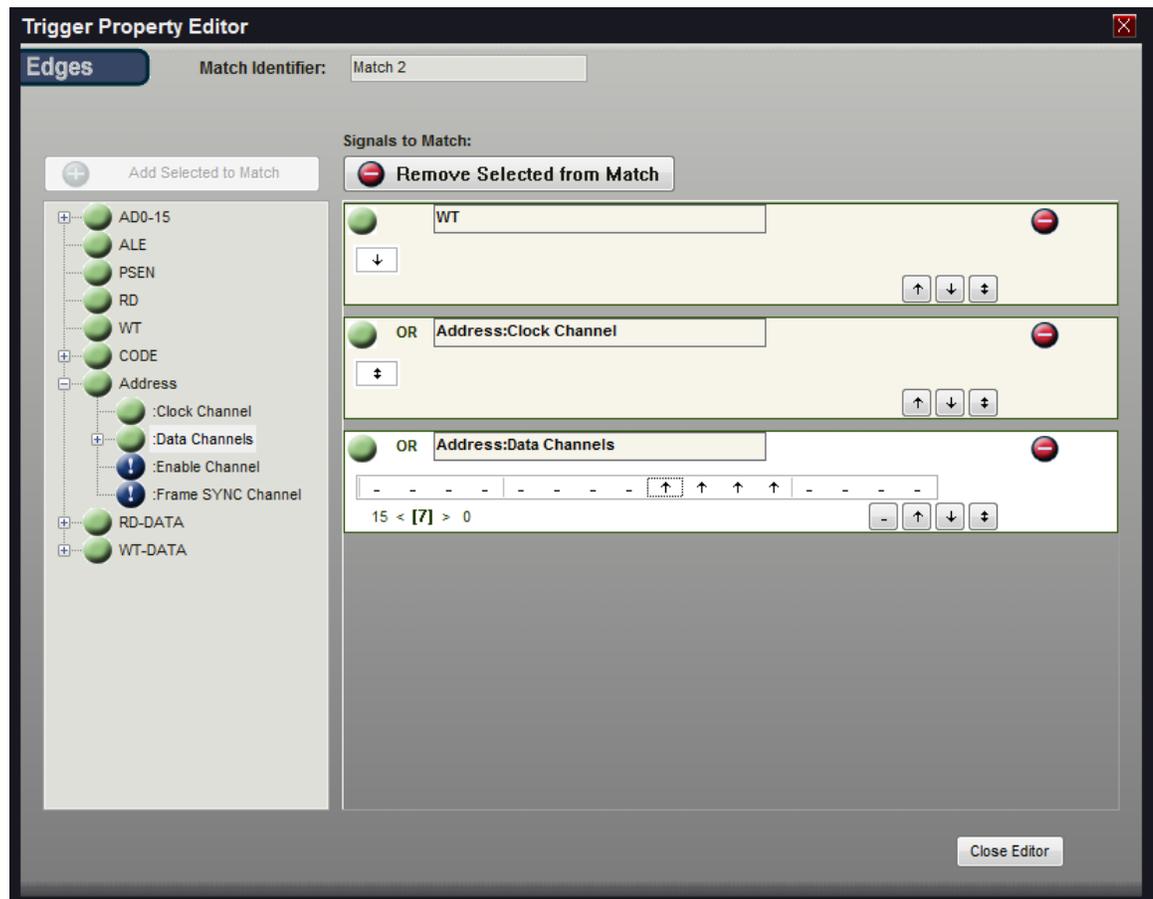
**Changing Bit Pattern** - Each bit of the signal can be toggled between the 3 states of '0', '1' and 'x' (don't care) by simply clicking on the bit position in the pattern edit area. To set all bits for a signal to one of these 3 values, use the X, 0 and 1 buttons to the upper-right of the pattern edit area.

**Identifier** - Change the identifier to something meaningful for the match condition if you do not want the default "Match #" to be displayed in the formula and the graphical configuration area of the trigger screen.

**Duration** - Enter the stability duration by selecting the units then typing the value. The Maximum Duration period for Models DV3200, DV3209, DV3400, DV3409 and DV3500 is 5 ms; 10ms for Models DV3100 and DV3109. The Trigger condition will not be considered as "True" until the selected signals (and bits) match the pattern for the indicated duration period.

#### 3.2.2.3.2 Edge Match

The edge trigger circuit is a 36 (or 72) input OR of rising edge and falling edge detectors. You can specify a trigger on rising, falling or transition on any combination of channels (rising edge of ALE or falling edge of OE or falling edge of WT or transition on clock...). All '-' entries for a channel means "don't care". The Edges Match Editor is displayed below



**ADD a Signal** - Highlight a defined signal from the left portion of the window and click the "+" button to add it to the Edges Match. You can also just "Double-Click" the defined signal to automatically add it. NOTE: High Level signal definitions (such as State, I2C, or etc) cannot be added directly as a complete signal. However, the individual portions of the signal (such as :CLK above) can be added in the same manner. To see the sub-portions of a signal, click the "expand" button in the left column next to the signal's name, then add the sub portions in the same manner as any other signal.

For instance, if you have defined a State signal like the one above (Address) and you only want to add the :Clock Channel signal to the Edges match, then expand it and double-click on :Clock Channel.

**Note:** If a signal is valid for the trigger configuration, a green icon will be displayed next to it. Any other icon, such as the blue circle above on the Frame Sync channel of the Address signal, indicates a signal state that is invalid for triggering. This particular icon indicates that the signal is 'Disabled'. Selecting Ignore in the signal definition editor for a particular sub-signal will disable the sub-signal throughout the application.

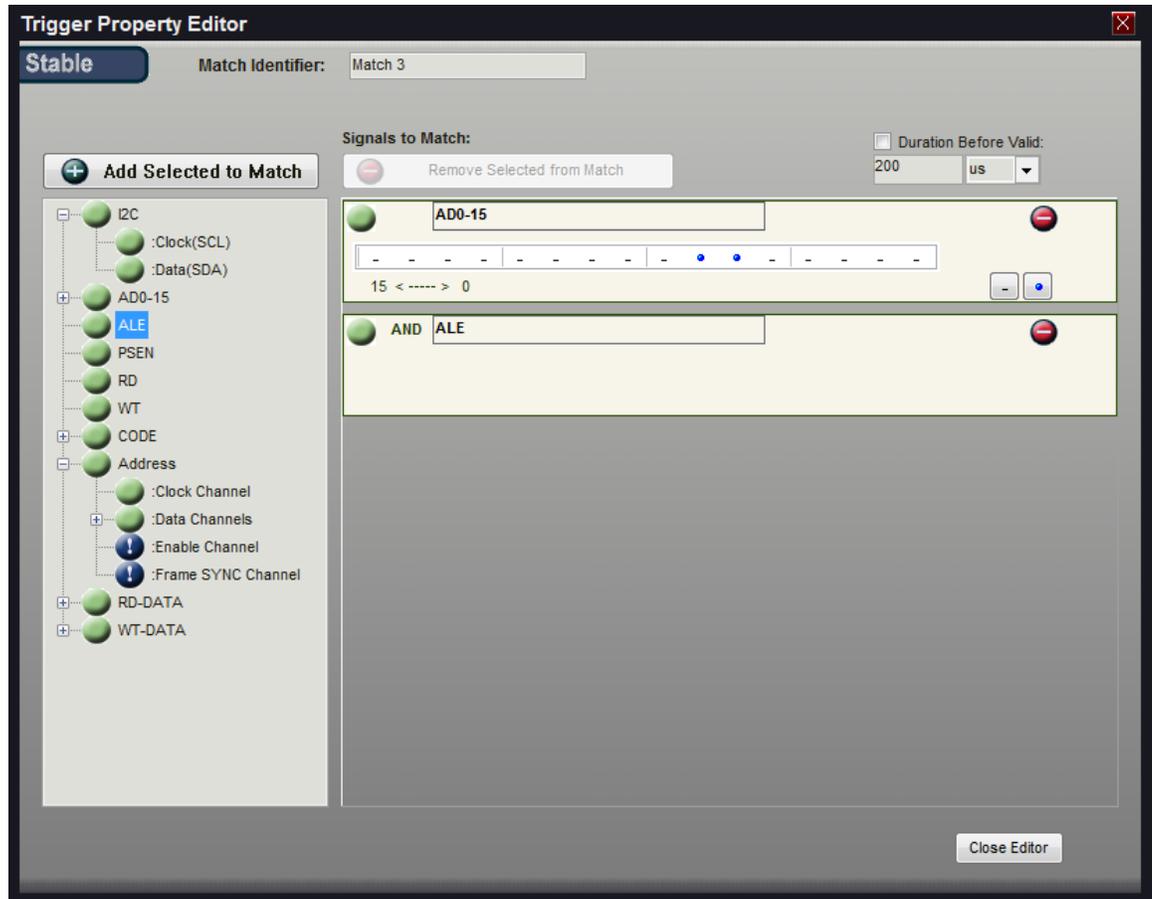
**Delete a Signal** - Highlight a signal in the right portion of the window (or mouse-over its bit selections) and click the "-" button to delete it from the Edges Match.

**Changing Bit Pattern** - Each bit of the signal can be toggled between the 4 states of '-' (don't care), 'rising', 'falling' and 'either' by simply clicking on the bit position in the Edges edit area. To set all bits for a signal to one of these 4 values, use the buttons to the upper-right of the Edges edit area.

**Identifier** - Change the identifier to something meaningful for the match condition if you do not want the default "Match #" to be displayed in the formula and the graphical configuration area of the trigger screen.

## 3.2.2.3.3 Stable Match

All '-' entries for a channel means "don't care". The Stable Match Editor is displayed below.



**ADD a Signal** - Highlight a defined signal from the left portion of the window and click the "+" button to add it to the Stable Match. You can also just "Double-Click" the defined signal to automatically add it. NOTE: High Level signal definitions (such as State, I2C, or etc) cannot be added directly as a complete signal. However, the individual portions of the signal (such as :Clock(SCL) above) can be added in the same manner. To see the sub-portions of a signal, click the "expand" button in the left column next to the signal's name, then add the sub portions in the same manner as any other signal.

For instance, if you have defined an I2C signal and you only want to add :Clock(SCL) to the Stable match, then expand it and double-click on :Clock(SCL). It would then appear on the right portion of the editor as "AND I2C:Clock(SCL)" like the ALE signal above.

**Note:** If a signal is valid for the trigger configuration, a green icon will be displayed next to it. Any other icon, such as the blue circle above on the Frame Sync channel of the Address signal, indicates a signal state that is invalid for triggering. This particular icon indicates that the signal is 'Disabled'. Selecting Ignore in the signal definition editor for a particular sub-signal will disable the sub-signal throughout the application.

**Delete a Signal** - Highlight a signal in the right portion of the window (or mouse-over its bit

selections) and click the "-" button to delete it from the Stable Match.

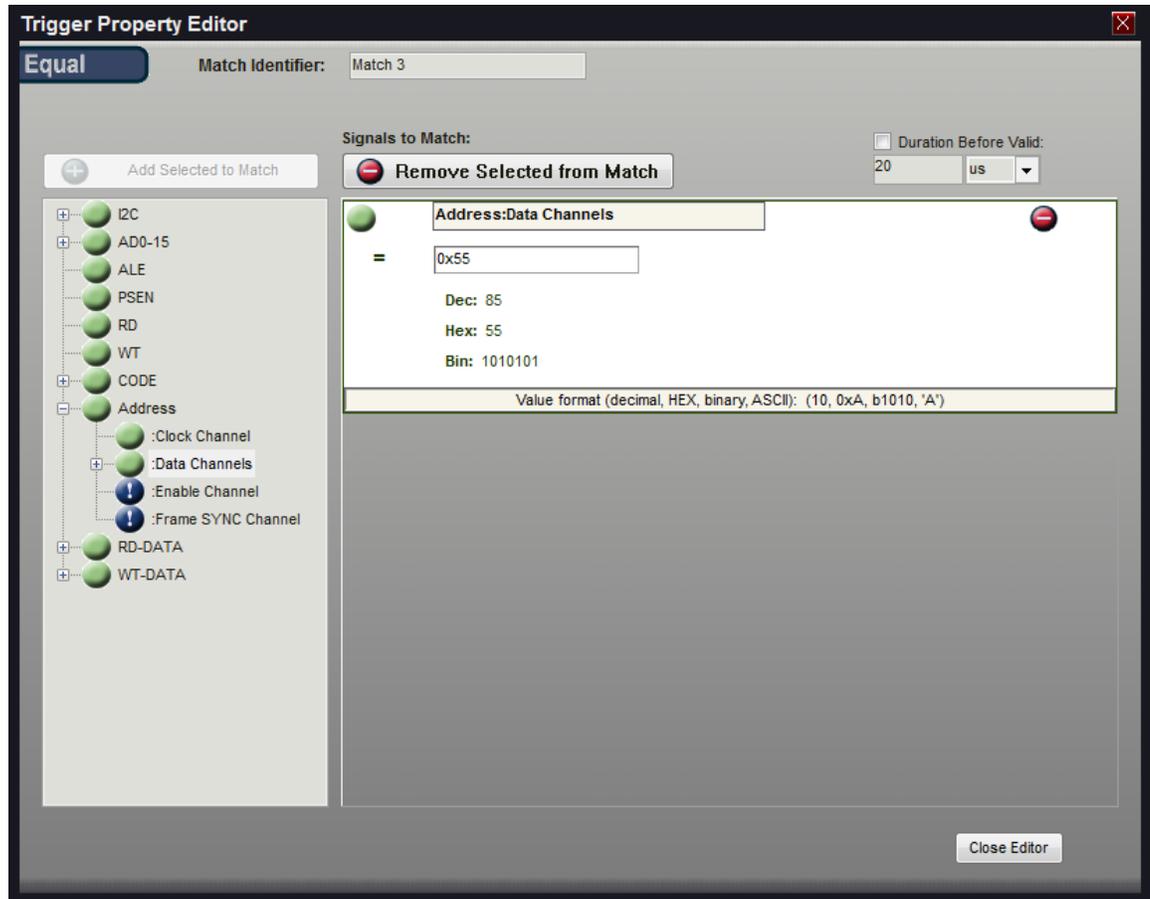
**Selecting Stable bits** - Each bit of the signal can be toggled between the 2 states of '-' (don't care) and 'STABLE' by simply clicking on the bit position in the Stable edit area. To set all bits for a signal to one of these 2 values, use the buttons to the upper-right of the Stable edit area. Boolean signals, if added, do not offer a choice and should be removed when they are no longer needed as part of the Stable match.

**Duration** - Enter the stability duration by selecting the units then typing the value. The Maximum Duration period for Models DV3200, DV3209, DV3400, DV3409 and DV3500 is 5 ms; 10ms for Models DV3100 and DV3109. The Trigger condition will not be considered as "True" until the selected signals (and bits) have been stable for the indicated duration period.

**Identifier** - Change the identifier to something meaningful for the match condition if you do not want the default "Match #" to be displayed in the formula and the graphical configuration area of the trigger screen.

3.2.2.3.4 Equal Match

The Equal Match Editor:



**ADD a Signal** - Highlight a defined signal from the left portion of the window and click the "+"

button to add it as the Equal Match. You can also just "Double-Click" the defined signal to automatically add it. NOTE: High Level signal definitions (such as State, I2C, or etc) cannot be added directly as a complete signal. However, the individual portions of the signal (such as the 'Data Channels' portion of a State Signal) can be added in the same manner. To see the sub-portions of a signal, click the "expand" button in the left column next to the signal's name, then add the sub portion in the same manner as any other signal.

For instance, if you have defined a State signal and you want to add the Data portion of the signal to the Equal match, then expand it and double-click on :Data Channels. It would then appear on the right portion of the editor as shown above.

The Equal Match type only accepts one signal at a time. If you attempt to add a second signal, a dialog will appear asking if you want to replace the existing signal with the current one.

**Note:** If a signal is valid for the trigger configuration, a green icon will be displayed next to it. Any other icon, such as the blue circle above on the Frame Sync channel of the Address signal, indicates a signal state that is invalid for triggering. This particular icon indicates that the signal is 'Disabled'. Selecting Ignore in the signal definition editor for a particular sub-signal will disable the sub-signal throughout the application.

**Delete a Signal** - Highlight a signal in the right portion of the window (or mouse-over its bit selections) and click the "-" button to delete it from the Equal Match.

**Match Value Format** - The value for the Equal Match type can be entered in Decimal, HEX, Binary or ASCII format. The value will be limited to the maximum value allowed for the selected signal, which will depend on the number of bit positions assigned to the signal. The formats for entering each value type is described below.

**Decimal:** Enter any valid decimal value. An Invalid value will be cleared to 0 or assumed to be HEX.

**HEX:** Start the value with an "x" or a "0x". If too many digits are entered, the most significant nibble (leftmost) will be discarded. Any non-HEX digit will be ignored.

**Binary:** Enter "b" followed by "1's" and "0's". If too many digits are typed, the MSb (leftmost bit) will be discarded. Any numerical value larger than a "1" or non-numerical character will be considered a "1".

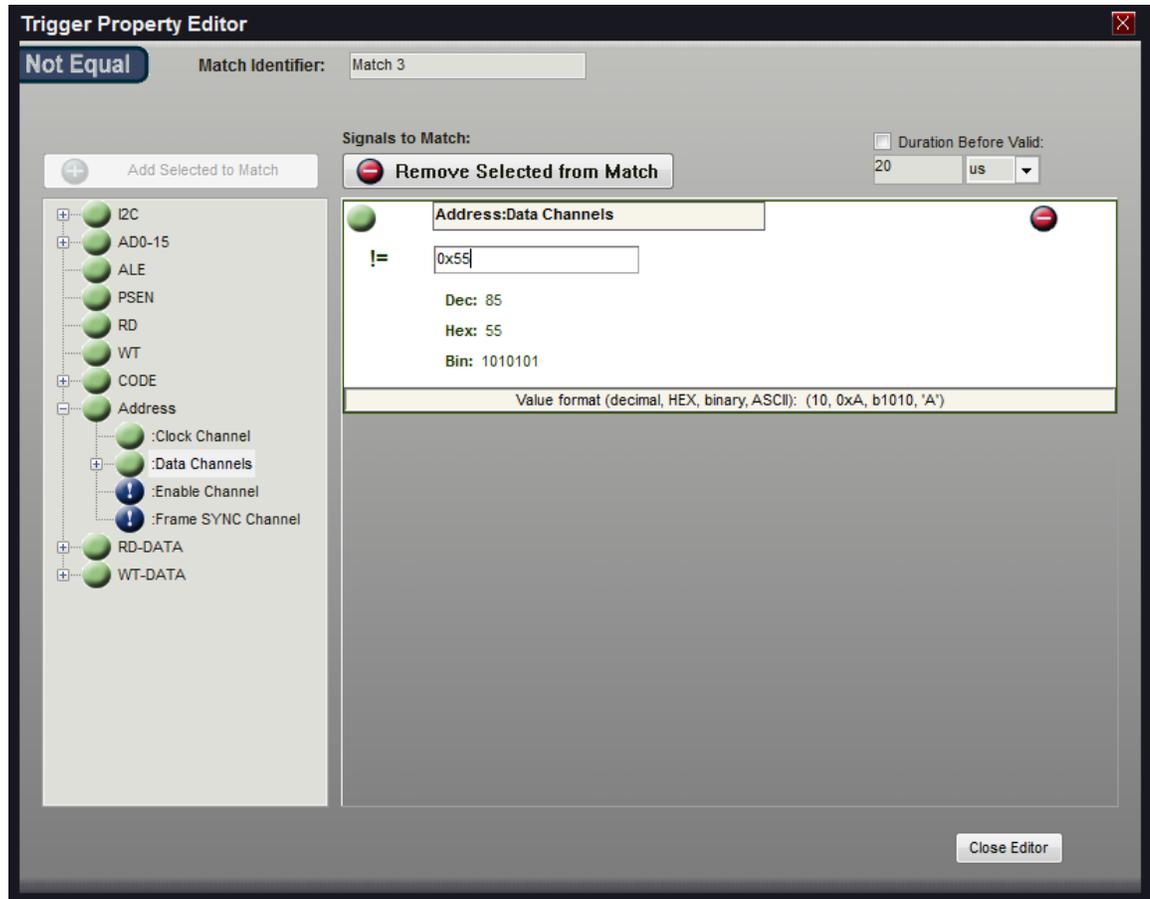
**ASCII:** Start the value with a single or double quote.

**Duration** - Enter the match duration by selecting the units then typing the value. The Maximum Duration period for Models DV3200, DV3209, DV3400, DV3409 and DV3500 is 5 ms; 10ms for Models DV3100 and DV3109. The Trigger condition will not be considered as "True" until the entered value for the selected signal has been valid for the indicated duration period.

**Identifier** - Change the identifier to something meaningful for the match condition if you do not want the default "Match #" to be displayed in the formula and the graphical configuration area of the trigger screen.

3.2.2.3.5 Not Equal Match

The NOT Equal Match Editor:



**ADD a Signal** - Highlight a defined signal from the left portion of the window and click the "+" button to add it as the NOT Equal Match. You can also just "Double-Click" the defined signal to automatically add it. NOTE: High Level signal definitions (such as State, I2C, or etc) cannot be added directly as a complete signal. However, the individual portions of the signal (such as the Data Channel portion of a State Signal) can be added in the same manner. To see the sub-portions of a signal, click the "expand" button in the left column next to the signal's name, then add the sub portion in the same manner as any other signal.

For instance, if you have defined a Synchronous Serial signal (i.e. SPI) and you want to add the :Enable portion of the signal to the NOT Equal match, then expand it and double-click on :Enable. It would then appear on the right portion of the editor.

The NOT Equal Match type only accepts one signal at a time. If you attempt to add a second signal, a dialog will appear asking if you want to replace the existing signal with the current one.

**Note:** If a signal is valid for the trigger configuration, a green icon will be displayed next to it. Any other icon, such as the blue circle above on the Frame Sync channel of the Address signal, indicates a signal state that is invalid for triggering. This particular icon indicates that the signal is 'Disabled'. Selecting Ignore in the signal definition editor for a particular

sub-signal will disable the sub-signal throughout the application.

**Delete a Signal** - Highlight a signal in the right portion of the window (or mouse-over its bit selections) and click the "-" button to delete it from the NOT Equal Match.

**Match Value Format** - The value for the Not Equal Match type can be entered in Decimal, HEX, Binary or ASCII format. The value will be limited to the maximum value allowed for the selected signal, which will depend on the number of bit positions assigned to the signal. The formats for entering each value type is described below.

**Decimal:** Enter any valid decimal value. An Invalid value will be cleared to 0 or assumed to be HEX.

**HEX:** Start the value with an "x" or a "0x". If too many digits are entered, the most significant nibble (leftmost) will be discarded. Any non-HEX digit will be ignored.

**Binary:** Enter "b" followed by "1's" and "0's". If too many digits are typed, the MSb (leftmost bit) will be discarded. Any numerical value larger than a "1" or non-numerical character will be considered a "1".

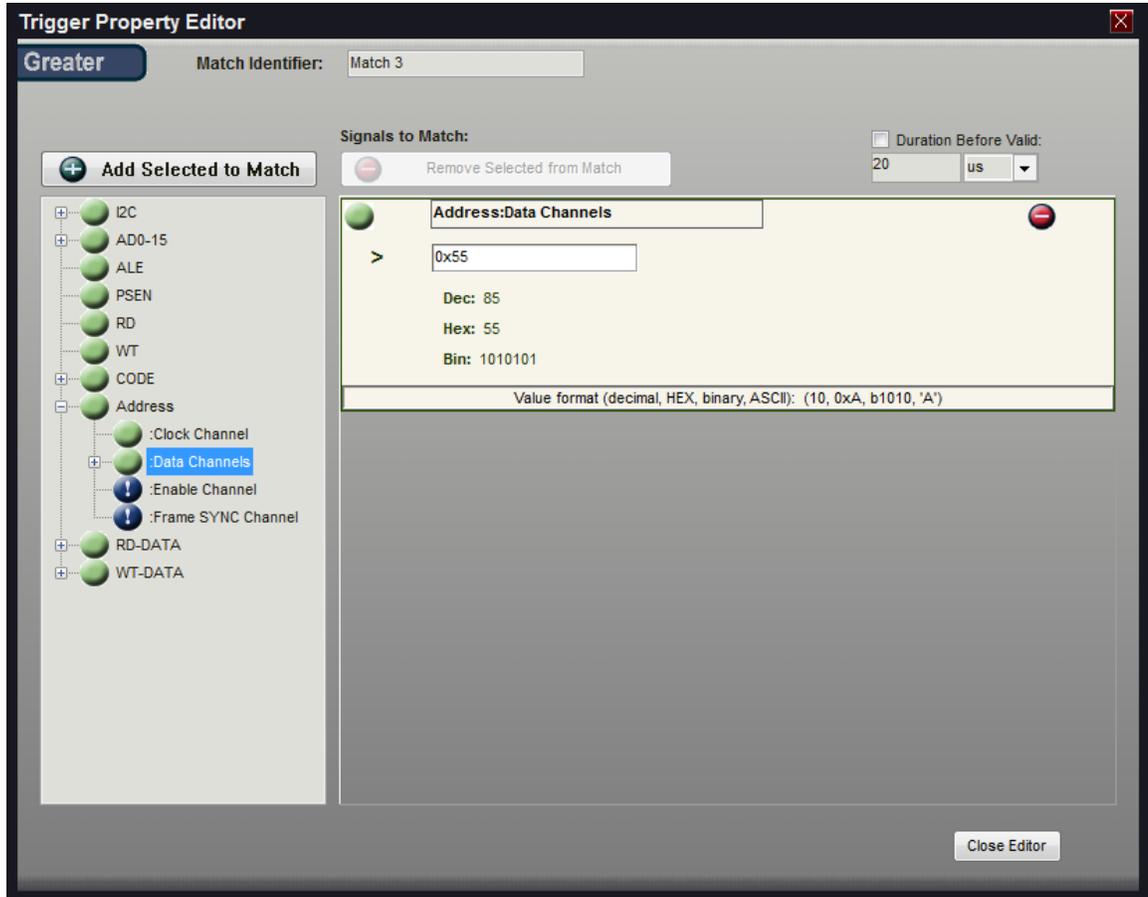
**ASCII:** Start the value with a single or double quote.

**Duration** - Enter the match duration by selecting the units then typing the value. The Maximum Duration period for Models DV3200, DV3209, DV3400, DV3409 and DV3500 is 5 ms; 10ms for Models DV3100 and DV3109. The Trigger condition will not be considered as "True" until the entered value for the selected signal has been valid for the indicated duration period.

**Identifier** - Change the identifier to something meaningful for the match condition if you do not want the default "Match #" to be displayed in the formula and the graphical configuration area of the trigger screen.

3.2.2.3.6 Greater Than Match

The Greater Than Match Editor:



**ADD a Signal** - Highlight a defined signal from the left portion of the window and click the "+" button to add it as the Greater Than Match. You can also just "Double-Click" the defined signal to automatically add it. NOTE: High Level signal definitions (such as State, I2C, or etc) cannot be added directly as a complete signal. However, the individual portions of the signal (such as the Data Channel portion of a State Signal) can be added in the same manner. To see the sub-portions of a signal, click the "expand" button in the left column next to the signal's name, then add the sub portion in the same manner as any other signal.

For instance, if you have defined a Synchronous Serial signal (i.e. SPI) and you want to add the :Enable portion of the signal to the Greater Than match, then expand it and double-click on :Enable. It would then appear on the right portion of the editor.

The Greater Than Match type only accepts one signal at a time. If you attempt to add a second signal, a dialog will appear asking if you want to replace the existing signal with the current one.

**Note:** If a signal is valid for the trigger configuration, a green icon will be displayed next to it. Any other icon, such as the blue circle above on the Frame Sync channel of the Address signal, indicates a signal state that is invalid for triggering. This particular icon indicates that the signal is 'Disabled'. Selecting Ignore in the signal definition editor for a particular

sub-signal will disable the sub-signal throughout the application.

**Delete a Signal** - Highlight a signal in the right portion of the window (or mouse-over its bit selections) and click the "-" button to delete it from the Greater Than Match.

**Match Value Format** - The value for the Greater Than Match type can be entered in Decimal, HEX, Binary or ASCII format. The value will be limited to the maximum value allowed for the selected signal, which will depend on the number of bit positions assigned to the signal. The formats for entering each value type is described below.

**Decimal:** Enter any valid decimal value. An Invalid value will be cleared to 0 or assumed to be HEX.

**HEX:** Start the value with an "x" or a "0x". If too many digits are entered, the most significant nibble (leftmost) will be discarded. Any non-HEX digit will be ignored.

**Binary:** Enter "b" followed by "1's" and "0's". If too many digits are typed, the MSb (leftmost bit) will be discarded. Any numerical value larger than a "1" or non-numerical character will be considered a "1".

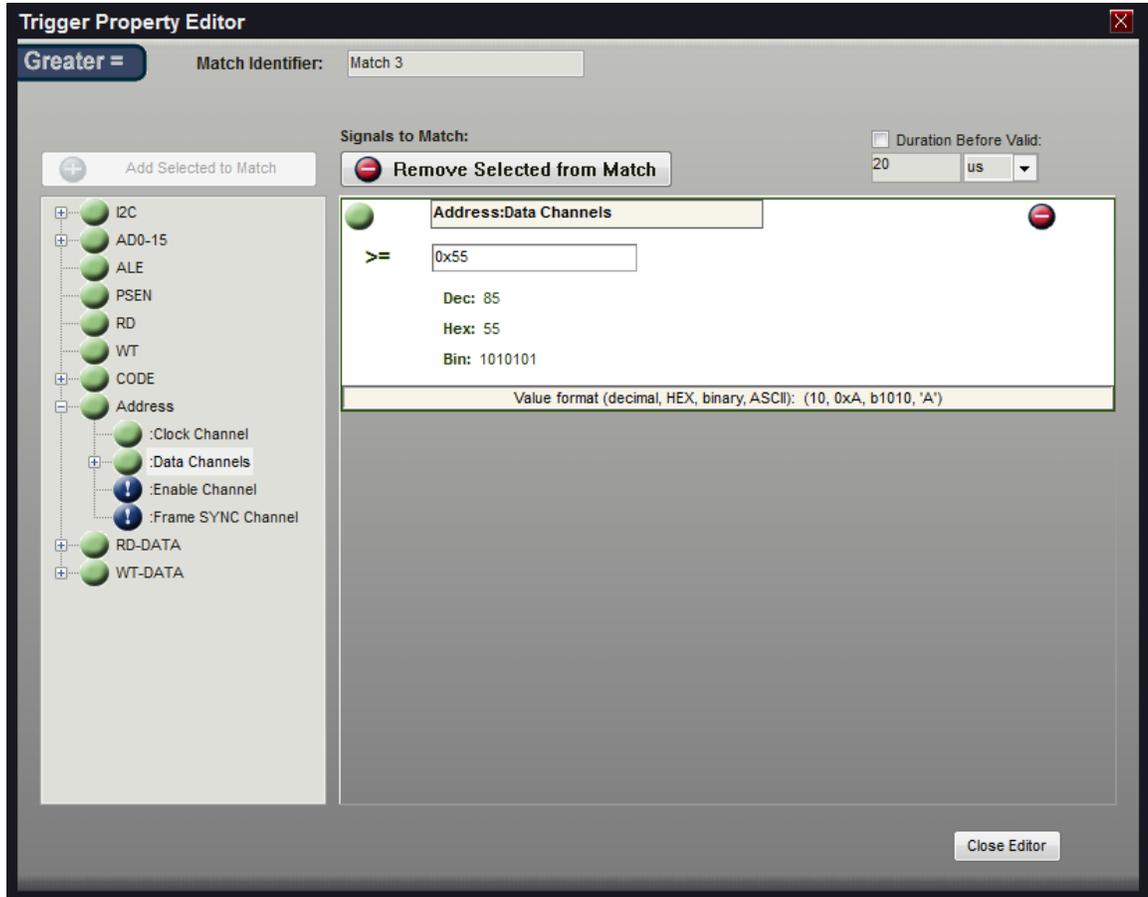
**ASCII:** Start the value with a single or double quote.

**Duration** - Enter the match duration by selecting the units then typing the value. The Maximum Duration period for Models DV3200, DV3209, DV3400, DV3409 and DV3500 is 5 ms; 10ms for Models DV3100 and DV3109. The Trigger condition will not be considered as "True" until the entered value for the selected signal has been valid for the indicated duration period.

**Identifier** - Change the identifier to something meaningful for the match condition if you do not want the default "Match #" to be displayed in the formula and the graphical configuration area of the trigger screen.

3.2.2.3.7 Greater Than or Equal Match

The Greater Than or Equal Match Editor:



**ADD a Signal** - Highlight a defined signal from the left portion of the window and click the "+" button to add it as the Greater Than or Equal Match. You can also just "Double-Click" the defined signal to automatically add it. NOTE: High Level signal definitions (such as State, I2C, or etc) cannot be added directly as a complete signal. However, the individual portions of the signal (such as the Data Channels portion of a State Signal) can be added in the same manner. To see the sub-portions of a signal, click the "expand" button in the left column next to the signal's name, then add the sub portion in the same manner as any other signal.

For instance, if you have defined a Synchronous Serial signal (i.e. SPI) and you want to add the :Enable portion of the signal to the Greater Than match, then expand it and double-click on :Enable. It would then appear on the right portion of the editor.

The Greater Than or Equal Match type only accepts one signal at a time. If you attempt to add a second signal, a dialog will appear asking if you want to replace the existing signal with the current one.

**Note:** If a signal is valid for the trigger configuration, a green icon will be displayed next to it. Any other icon, such as the blue circle above on the Frame Sync channel of the Address signal, indicates a signal state that is invalid for triggering. This particular icon indicates that

the signal is 'Disabled'. Selecting Ignore in the signal definition editor for a particular sub-signal will disable the sub-signal throughout the application.

**Delete a Signal** - Highlight a signal in the right portion of the window (or mouse-over its bit selections) and click the "-" button to delete it from the Greater Than or Equal Match.

**Match Value Format** - The value for the Greater Than or Equal Match type can be entered in Decimal, HEX, Binary or ASCII format. The value will be limited to the maximum value allowed for the selected signal, which will depend on the number of bit positions assigned to the signal. The formats for entering each value type is described below.

**Decimal:** Enter any valid decimal value. An Invalid value will be cleared to 0 or assumed to be HEX.

**HEX:** Start the value with an "x" or a "0x". If too many digits are entered, the most significant nibble (leftmost) will be discarded. Any non-HEX digit will be ignored.

**Binary:** Enter "b" followed by "1's" and "0's". If too many digits are typed, the MSb (leftmost bit) will be discarded. Any numerical value larger than a "1" or non-numerical character will be considered a "1".

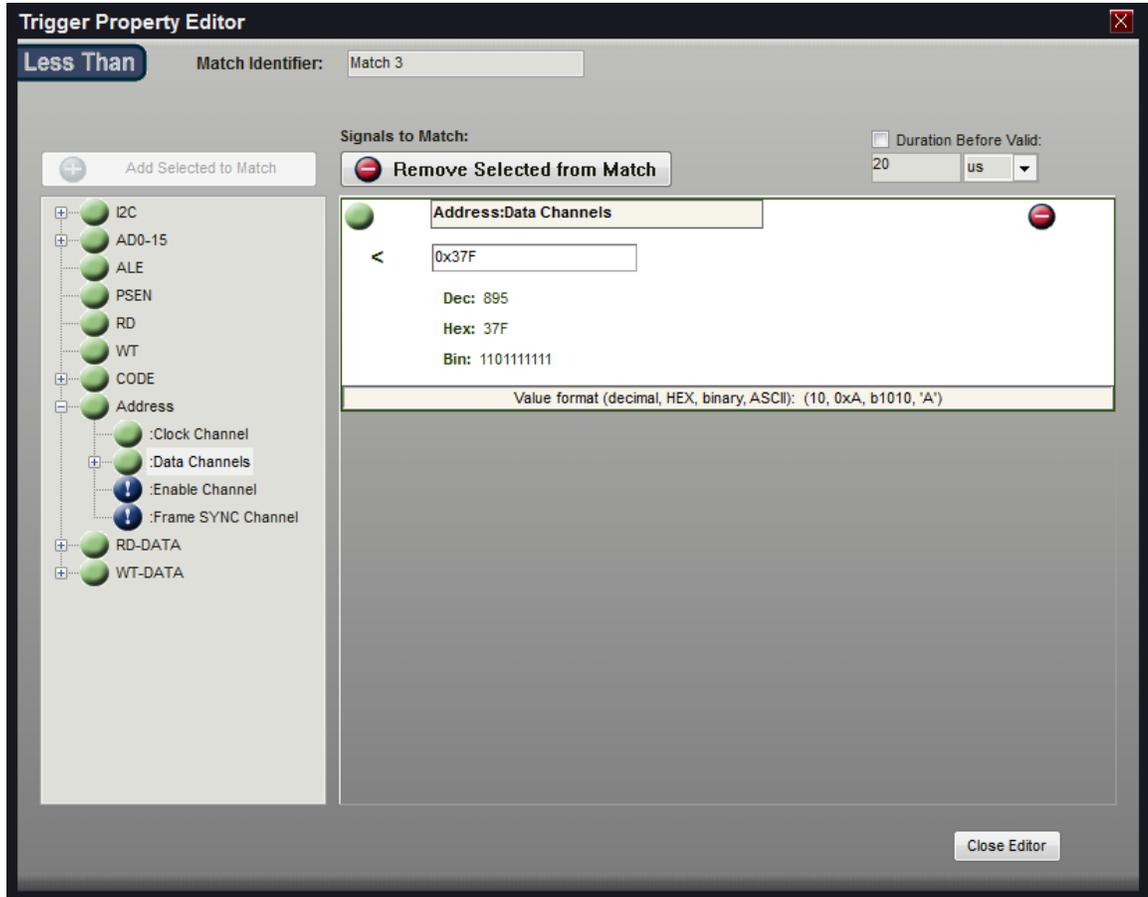
**ASCII:** Start the value with a single or double quote.

**Duration** - Enter the match duration by selecting the units then typing the value. The Maximum Duration period for Models DV3200, DV3209, DV3400, DV3409 and DV3500 is 5 ms; 10ms for Models DV3100 and DV3109. The Trigger condition will not be considered as "True" until the entered value for the selected signal has been valid for the indicated duration period.

**Identifier** - Change the identifier to something meaningful for the match condition if you do not want the default "Match #" to be displayed in the formula and the graphical configuration area of the trigger screen.

3.2.2.3.8 Less Than Match

The Less Than Match Editor:



**ADD a Signal** - Highlight a defined signal from the left portion of the window and click the "+" button to add it as the Less Than Match. You can also just "Double-Click" the defined signal to automatically add it. NOTE: High Level signal definitions (such as State, I2C, or etc) cannot be added directly as a complete signal. However, the individual portions of the signal (such as the Data Channels portion of a State Signal) can be added in the same manner. To see the sub-portions of a signal, click the "expand" button in the left column next to the signal's name, then add the sub portion in the same manner as any other signal.

For instance, if you have defined a Synchronous Serial signal (i.e. SPI) and you want to add the :Enable portion of the signal to the Less Than match, then expand it and double-click on :Enable. It would then appear on the right portion of the editor.

The Less Than Match type only accepts one signal at a time. If you attempt to add a second signal, a dialog will appear asking if you want to replace the existing signal with the current one.

**Note:** If a signal is valid for the trigger configuration, a green icon will be displayed next to it. Any other icon, such as the blue circle above on the Frame Sync channel of the Address signal, indicates a signal state that is invalid for triggering. This particular icon indicates that the signal is 'Disabled'. Selecting Ignore in the signal definition editor for a particular

sub-signal will disable the sub-signal throughout the application.

**Delete a Signal** - Highlight a signal in the right portion of the window (or mouse-over its bit selections) and click the "-" button to delete it from the Less Than Match.

**Match Value Format** - The value for the Less Than Match type can be entered in Decimal, HEX, Binary or ASCII format. The value will be limited to the maximum value allowed for the selected signal, which will depend on the number of bit positions assigned to the signal. The formats for entering each value type is described below.

**Decimal:** Enter any valid decimal value. An Invalid value will be cleared to 0 or assumed to be HEX.

**HEX:** Start the value with an "x" or a "0x". If too many digits are entered, the most significant nibble (leftmost) will be discarded. Any non-HEX digit will be ignored.

**Binary:** Enter "b" followed by "1's" and "0's". If too many digits are typed, the Msb (leftmost bit) will be discarded. Any numerical value larger than a "1" or non-numerical character will be considered a "1".

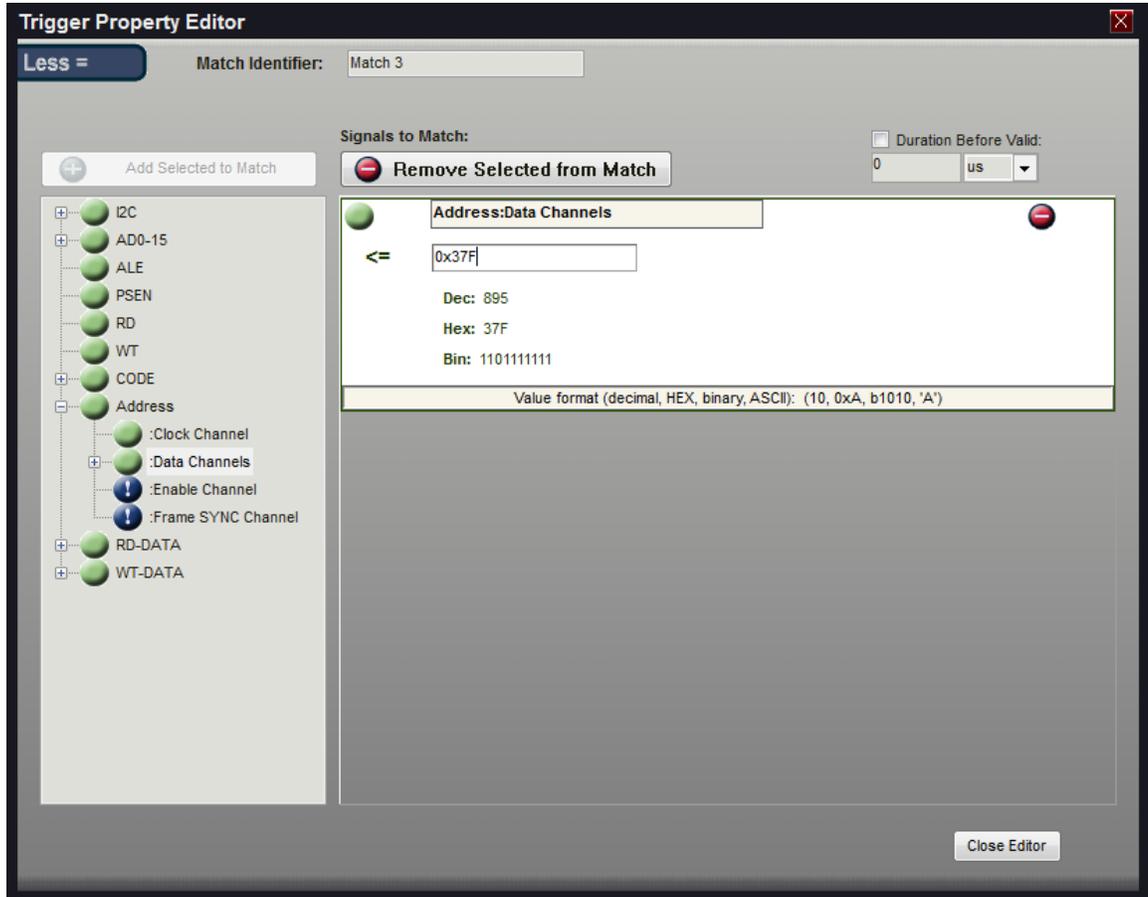
**ASCII:** Start the value with a single or double quote.

**Duration** - Enter the match duration by selecting the units then typing the value. The Maximum Duration period for Models DV3200, DV3209, DV3400, DV3409 and DV3500 is 5 ms; 10ms for Models DV3100 and DV3109. The Trigger condition will not be considered as "True" until the entered value for the selected signal has been valid for the indicated duration period.

**Identifier** - Change the identifier to something meaningful for the match condition if you do not want the default "Match #" to be displayed in the formula and the graphical configuration area of the trigger screen.

3.2.2.3.9 Less Than or Equal Match

The Less Than or Equal Match Editor:



**ADD a Signal** - Highlight a defined signal from the left portion of the window and click the "+" button to add it as the Less Than or Equal Match. You can also just "Double-Click" the defined signal to automatically add it. NOTE: High Level signal definitions (such as State, I2C, or etc) cannot be added directly as a complete signal. However, the individual portions of the signal (such as the DATA portion of a State Signal) can be added in the same manner. To see the sub-portions of a signal, click the "expand" button in the left column next to the signal's name, then add the sub portion in the same manner as any other signal.

For instance, if you have defined a Synchronous Serial signal (i.e. SPI) and you want to add the :Enable portion of the signal to the Greater Than match, then expand it and double-click on :Enable. It would then appear on the right portion of the editor.

The Less Than or Equal Match type only accepts one signal at a time. If you attempt to add a second signal, a dialog will appear asking if you want to replace the existing signal with the current one.

**Note:** If a signal is valid for the trigger configuration, a green icon will be displayed next to it. Any other icon, such as the blue circle above on the Frame Sync channel of the Address signal, indicates a signal state that is invalid for triggering. This particular icon indicates that

the signal is 'Disabled'. Selecting Ignore in the signal definition editor for a particular sub-signal will disable the sub-signal throughout the application.

**Delete a Signal** - Highlight a signal in the right portion of the window (or mouse-over its bit selections) and click the "-" button to delete it from the Less Than or Equal Match.

**Match Value Format** - The value for the Less Than or Equal Match type can be entered in Decimal, HEX, Binary or ASCII format. The value will be limited to the maximum value allowed for the selected signal, which will depend on the number of bit positions assigned to the signal. The formats for entering each value type is described below.

**Decimal:** Enter any valid decimal value. An Invalid value will be cleared to 0 or assumed to be HEX.

**HEX:** Start the value with an "x" or a "0x". If too many digits are entered, the most significant nibble (leftmost) will be discarded. Any non-HEX digit will be ignored.

**Binary:** Enter "b" followed by "1's" and "0's". If too many digits are typed, the MSb (leftmost bit) will be discarded. Any numerical value larger than a "1" or non-numerical character will be considered a "1".

**ASCII:** Start the value with a single or double quote.

**Duration** - Enter the match duration by selecting the units then typing the value. The Maximum Duration period for Models DV3200, DV3209, DV3400, DV3409 and DV3500 is 5 ms; 10ms for Models DV3100 and DV3109. The Trigger condition will not be considered as "True" until the entered value for the selected signal has been valid for the indicated duration period.

**Identifier** - Change the identifier to something meaningful for the match condition if you do not want the default "Match #" to be displayed in the formula and the graphical configuration area of the trigger screen.

### 3.3 Analyzer Options

Each model of DigiView has a different set of options that can be adjusted directly from the software. Options are grouped by category on the left side of the window. Select the category using the mouse to modify the options in that group.

Some options update the hardware immediately (Threshold settings) while other options will not update the hardware until you click on the Apply button, leave the Analyzer Options tab or close the configuration window. Options that do not immediately update can be reset by selecting the Cancel button.

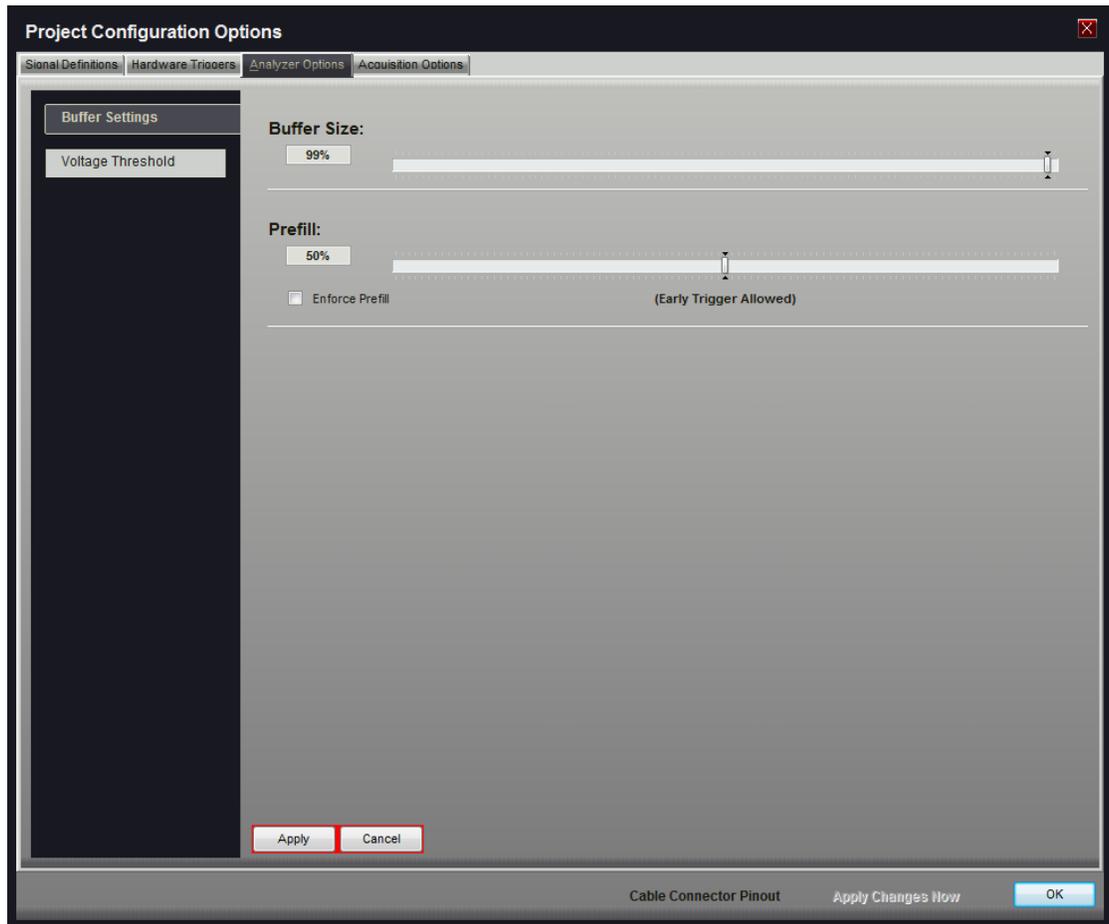


To access Analyzer Options click the Project Settings button from the tool bar, then select the Analyzer Options tab.

- [Buffer Settings](#)<sup>[88]</sup>
- [Voltage Thresholds](#)<sup>[90]</sup>

#### 3.3.1 Buffer Settings

These settings apply to all current DigiView models (see [Analyzer Options](#)<sup>[88]</sup> for additional hardware settings) .



**Buffer Size** - Adjust the amount of capture buffer (1% - 100%) to use in the Hardware.

**Prefill** - Adjust the amount of buffer to use for data captured before the trigger event. If no trigger event occurs, the analyzer will continuously refresh this portion of the buffer with the most recent data (circular queue). When the trigger event occurs, the remaining portion of the buffer will be filled with post-trigger data. The behavior of the prefill (or pre-trigger) portion of the buffer can be modified by the Enforce Prefill option.

**Enforce Prefill** - Select this option to force the analyzer to fill the buffer to the Prefill setting before looking for a trigger condition. If you do not need the full prefill amount before the trigger condition occurs, then uncheck this option to allow early detection of the trigger.

**Apply** - Save the modified settings.

**Cancel** - Discard any changes and reset to previous values.

### 3.3.2 Voltage Threshold

The voltage threshold is also known as the Trigger Threshold, Trigger Voltage or Transition voltage. When capturing the activity (voltage changes) on the channels, this is the voltage level that determines the difference between storing a 1 or storing a 0.

**For a typical circuit where the lowest voltage indicates a '0' and the highest voltage indicates a '1', you would set this value to the middle of those two voltages (i.e. for 5 Volt CMOS set the threshold to 2.50 volts).**

If too much noise activity is being captured, setting this level higher (away from ground bounce or noise) or lower (away from peak bounce or noise) will improve the quality of the capture and even extend the capture time by preventing the storage of phantom transitions or 'garbage'. When decoding serial protocols, capturing noise can cause poor decoding or no decoding at all.

The number of thresholds, the number of channels and the voltage range varies between models. These variations are shown below.

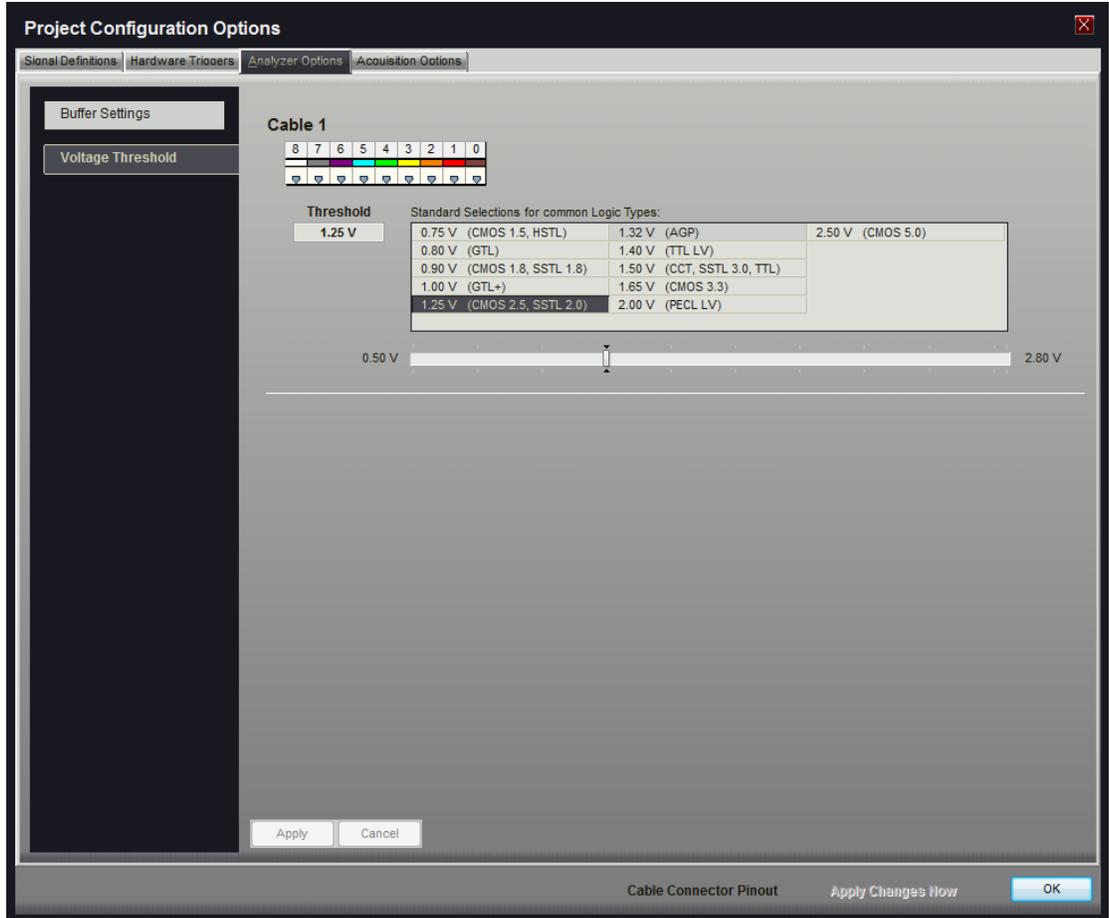
The cable(s) and channels affected by the threshold setting are displayed first. This area also displays the channel numbers, colors and the detected channel activity (relative to each other).

Below the channel indicator area is the current threshold value.

The selection box provides quick selection of standard values to use for common logic families and also indicates the current value in relation to these common settings. The slider bar beneath the selection box can be used to manually set a custom voltage. The mouse can be used to move the slider and once selected by the mouse, the cursor keys can be used for fine adjustment. If the selected voltage does not match a common selection, an indicator will be placed in the selection box between the two closest values.

Threshold adjustments update the hardware immediately.

**Threshold settings for Models DV3109, DV3209, DV3409 and Models DV3100, DV3200 (in 9 Channel Mode)**



Threshold settings for Models DV3100, DV3200 (in 18 Channel Mode)

**Project Configuration Options**

Signal Definitions | Hardware Triggers | Analyzer Options | Acquisition Options

Buffer Settings

Voltage Threshold

**Cable 1, Cable 2**

17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Threshold: **2.00 V**

Standard Selections for common Logic Types:

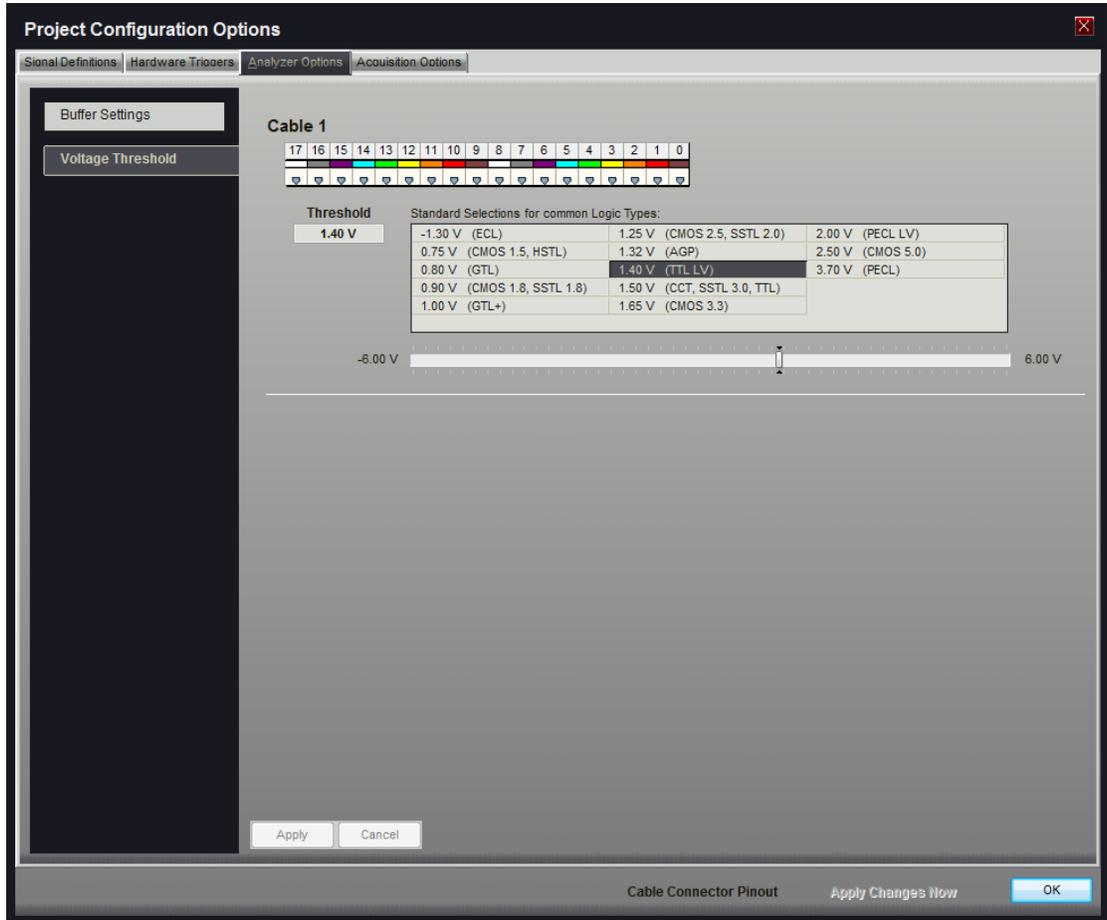
0.75 V (CMOS 1.5, HSTL)	1.32 V (AGP)	2.50 V (CMOS 5.0)
0.80 V (GTL)	1.40 V (TTL LV)	
0.90 V (CMOS 1.8, SSTL 1.8)	1.50 V (CCT, SSTL 3.0, TTL)	
1.00 V (GTL+)	1.65 V (CMOS 3.3)	
1.25 V (CMOS 2.5, SSTL 2.0)	2.00 V (PECL LV)	

0.50 V  2.80 V

Apply Cancel

Cable Connector Pinout Apply Changes Now OK

Model DV3400 (in 18 Channel Mode)



Model DV3400 (in 36 Channel Mode)

**Project Configuration Options**

Signal Definitions | Hardware Triggers | Analyzer Options | Acquisition Options

**Buffer Settings**

**Voltage Threshold**

**Cable 1**

17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼

**Threshold**  
0.25 V

Standard Selections for common Logic Types:

-1.30 V (ECL)	1.25 V (CMOS 2.5, SSTL 2.0)	2.00 V (PECL LV)
0.75 V (CMOS 1.5, HSTL)	1.32 V (AGP)	2.50 V (CMOS 5.0)
0.80 V (GTL)	1.40 V (TTL LV)	3.70 V (PECL)
0.90 V (CMOS 1.8, SSTL 1.8)	1.50 V (CCT, SSTL 3.0, TTL)	
1.00 V (GTL+)	1.65 V (CMOS 3.3)	

-6.00 V 6.00 V

---

**Cable 2**

35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼

**Threshold**  
2.50 V

Standard Selections for common Logic Types:

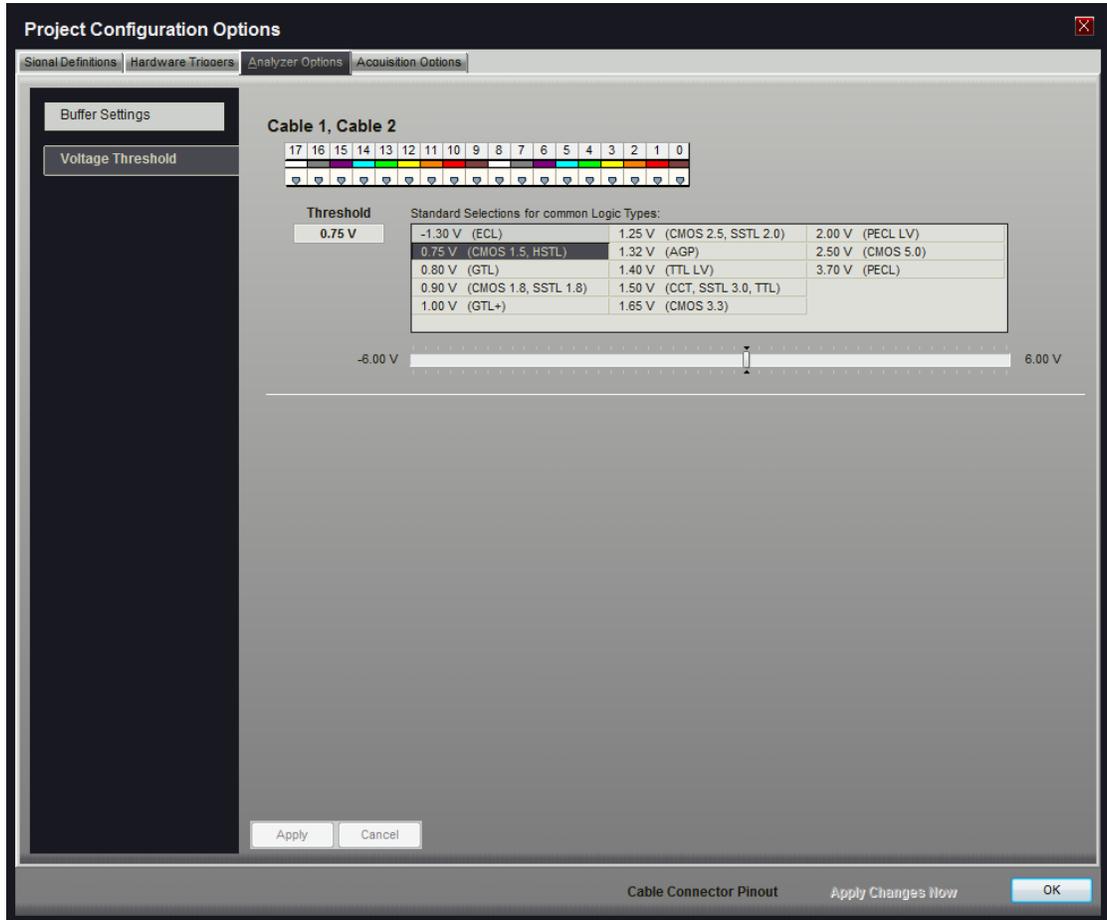
-1.30 V (ECL)	1.25 V (CMOS 2.5, SSTL 2.0)	2.00 V (PECL LV)
0.75 V (CMOS 1.5, HSTL)	1.32 V (AGP)	2.50 V (CMOS 5.0)
0.80 V (GTL)	1.40 V (TTL LV)	3.70 V (PECL)
0.90 V (CMOS 1.8, SSTL 1.8)	1.50 V (CCT, SSTL 3.0, TTL)	
1.00 V (GTL+)	1.65 V (CMOS 3.3)	

-6.00 V 6.00 V

Apply Cancel

Cable Connector Pinout Apply Changes Now OK

Model DV3500 (in 18 Channel Mode)



Model DV3500 (in 36 Channel Mode)

**Project Configuration Options**

Signal Definitions | Hardware Triggers | Analyzer Options | Acquisition Options

Buffer Settings

Voltage Threshold

**Cable 1, Cable 2**

17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼

Threshold: **1.00 V**

Standard Selections for common Logic Types:

-1.30 V (ECL)	1.25 V (CMOS 2.5, SSTL 2.0)	2.00 V (PECL LV)
0.75 V (CMOS 1.5, HSTL)	1.32 V (AGP)	2.50 V (CMOS 5.0)
0.80 V (GTL)	1.40 V (TTL LV)	3.70 V (PECL)
0.90 V (CMOS 1.8, SSTL 1.8)	1.50 V (CCT, SSTL 3.0, TTL)	
1.00 V (GTL+)	1.65 V (CMOS 3.3)	

-6.00 V 6.00 V

**Cable 3, Cable 4**

35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼

Threshold: **0.90 V**

Standard Selections for common Logic Types:

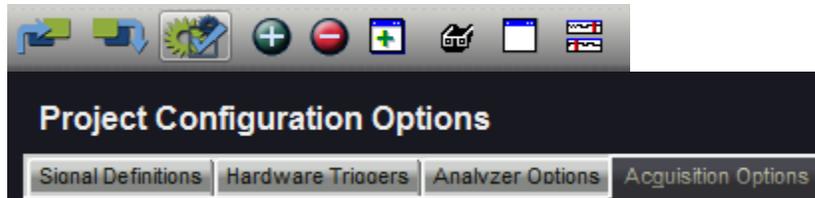
-1.30 V (ECL)	1.25 V (CMOS 2.5, SSTL 2.0)	2.00 V (PECL LV)
0.75 V (CMOS 1.5, HSTL)	1.32 V (AGP)	2.50 V (CMOS 5.0)
0.80 V (GTL)	1.40 V (TTL LV)	3.70 V (PECL)
0.90 V (CMOS 1.8, SSTL 1.8)	1.50 V (CCT, SSTL 3.0, TTL)	
1.00 V (GTL+)	1.65 V (CMOS 3.3)	

-6.00 V 6.00 V

Apply Cancel

Cable Connector Pinout Apply Changes Now OK

### 3.4 Acquisition Options



To change Acquisition options, select the Project Configuration Options button from the main toolbar then select the Acquisitions Tab.

#### Data Transfer

This option determines when to transfer the captured data from the analyzer.



**On Analyzer Buffer Full** - When selected, the data will automatically transfer to the screen when the analyzer's internal buffer is full. Depending on the Run mode, the analyzer will either halt or re-arm and continue capturing.

**On Timeout or Analyzer Buffer Full** - When selected, the data will automatically transfer after the selected timeout period even if a trigger condition was never encountered. If the trigger has fired and the buffer is full before the timeout period is reached, the transfer will take place normally and will not wait for the timeout period.

#### Display Behavior

These options control the default behavior when data is transferred for display on the screen. This includes newly captured data and data loaded from browsing through the Capture History.



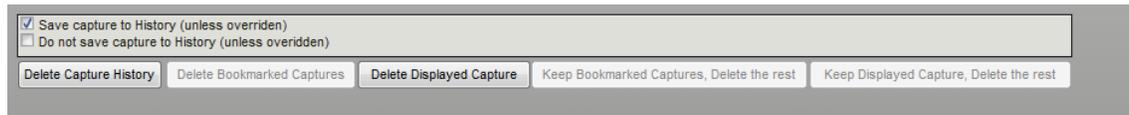
**Do Not Change Position** - When selected, the current time reference point remains the same. The Waveform Views will remain at their current time reference instead of scrolling to the trigger point or a selected marker position. NOTE: List windows always adjust to the time of the closest matching line of data, so they may change position slightly, based on the new data loaded.

**Scroll to Trigger** - When selected, the waveform windows will scroll to the trigger point.

**Scroll to Marker** - When selected, the waveform views will scroll to the chosen marker. After this option is selected, the Marker Selection options are available to make the marker selection.

## Capture History Options

These options control when to save captures to the history, the amount of storage to use and determine what action to take if these settings are exceeded. Changes to most of the options below require pressing the "Apply" button in order to reconfigure the history buffer. If this is required, the buttons will highlight with a red border to notify you. Pressing the "Cancel" button or leaving the Acquisition option window (when the buttons are highlighted) will discard any changes and restore your previous settings. When the apply button is pressed, the history will be reconfigured to the new settings and the database rebuilt. If needed, some files will be deleted to meet the new settings, starting with the oldest captures first.



**Save capture History** - When selected, each capture is stored in the history unless overridden by a plug-in or Auto Search window.

**Do Not Save capture History** - When selected, each capture is discarded when a new capture is acquired unless overridden by a plug-in or Auto Search window.

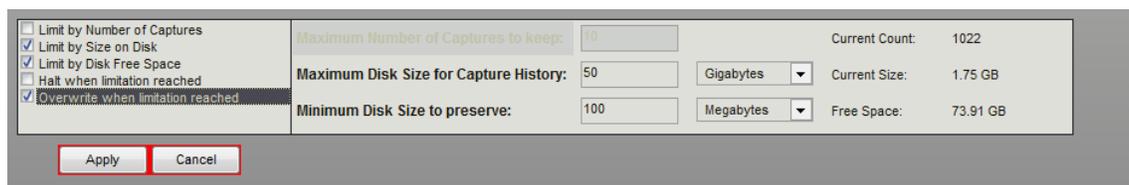
**Delete Capture History** - When pressed, all capture history files for the current project will be deleted, including the one being viewed. When opening a project file that does not have any history, the data stored within the project file will be saved as a history file. If history files exist for the project, but the current data is not found in the history, the data will be added to the history at the proper chronological position.

**Delete Bookmarked Captures** - When pressed, all Bookmarked capture history files will be deleted. All other files will be retained.

**Delete Displayed Capture** - When pressed, only the current loaded capture will be deleted. All other files will be retained.

**Keep Bookmarked Captures, Delete the rest** - When pressed, all capture history files will be deleted except the ones that have been Bookmarked.

**Keep Displayed Capture, Delete the rest** - When pressed, all capture history files will be deleted except the current loaded capture.



**Limit by Number of Captures** - Select this option to specify the exact number of captures to keep. Once selected, the number of captures can be specified in the *Maximum Number of Captures to keep* edit box.

**Limit by Size on Disk** - Select this option to specify the size of the storage space to use for the

capture history. Once selected, the size can be selected in the *Maximum Disk Size for Capture History* editor on the right.

**Limit by Disk Free Space** - Select this option to specify the amount of free space to reserve on the Hard Drive. Once selected, the size can be selected in the *Minimum Disk Size to preserve* editor on the right.

**Halt when limitation reached** - Select this option to halt the analyzer if any of the limitations specified above have been exceeded. A warning dialog will be displayed with information on which limit was exceeded.

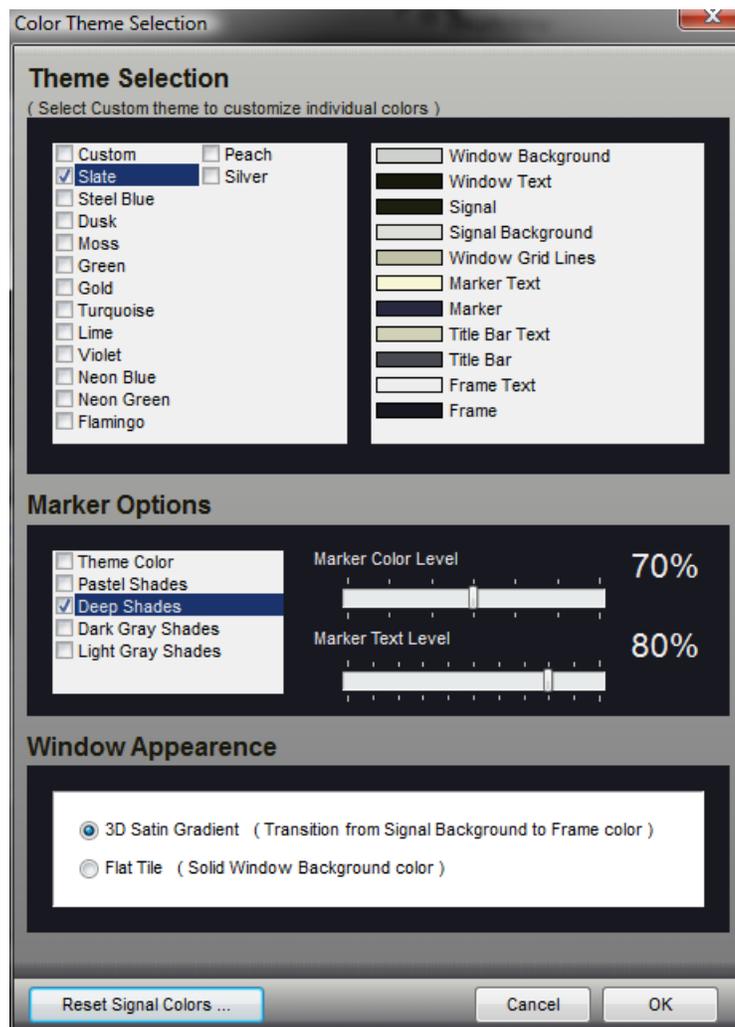
**Overwrite when limitation reached** - Select this option to automatically delete the oldest capture(s) to make room for the newest capture when any of the limitations specified above have been exceeded. The history will be maintained as a First in, First out (FIFO) buffer using the parameters specified above. When limitations are reached, no warning is presented as this configuration will automatically maintain the buffer using the specified limitations as new captures are added.

**History Monitor** - For your convenience, the current Capture Count, Storage Size and Disk Free Space are displayed to the right of the editors. This display is updated as capture files are added or deleted and can be used as a History monitor while capturing.

## 3.5 Color Themes

Several pre-defined color themes, a custom theme, marker color sets and Marker brightness can be selected from the Color Theme Selection window. This window is accessed from **Menu-> Configuration-> Color Theme**.

- All changes occur live throughout the Application but are not saved until accepted by pressing the OK button.
- All theme settings are Application wide and independent of the project.
- The factory default theme is Slate.

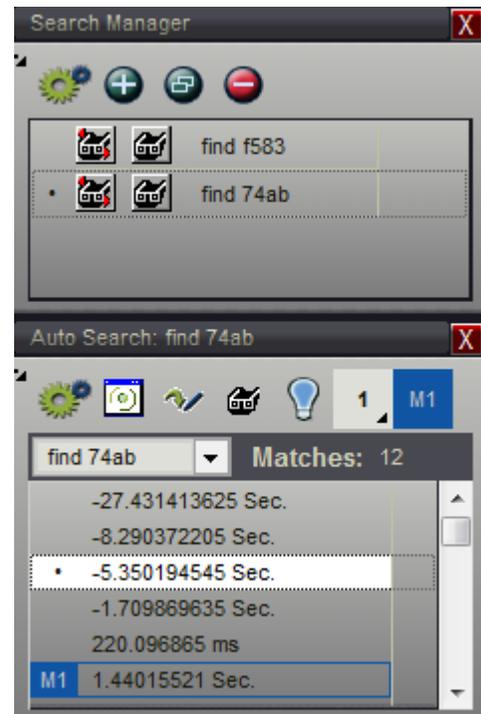


**Theme Selection** - Select "custom" if you would like to define your own colors, otherwise select from one of the pre-defined color schemes. The area to the right of the scheme selection displays a list of the items that are affected by theme changes along with the current theme color for that item. Due to the wide range of colors between themes, the Marker Options are saved for each theme independently and will refresh when changing the theme selection.

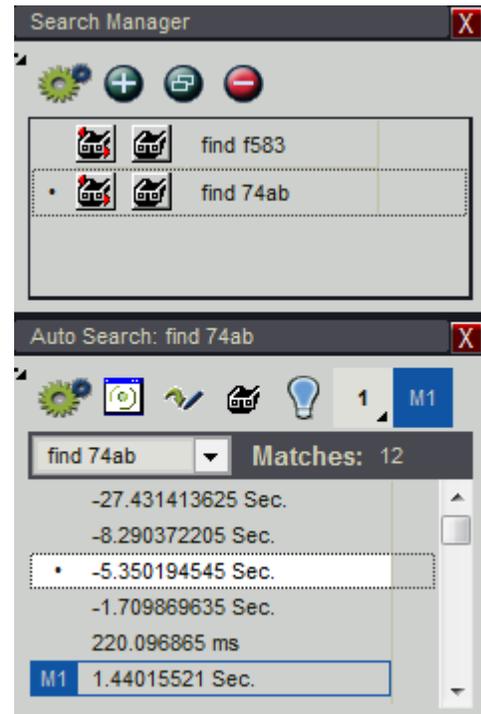
**Marker Options** - When selecting a theme, Marker Options will be updated to the selections previously used for the newly selected theme. When selecting a marker color set, the Marker Color Level and Marker Text Level settings will update to the settings last used for the set when the current theme was last selected.

**Window Appearance** - This setting will have a dramatic affect on the application's color appearance and brightness. This setting is independent of the selected color theme and marker options.

**3D Satin Gradient** - This selection paints most windows with a top to bottom transitional background color. The gradient begins with the Signal Background color and slowly transitions to the Frame color by the time the bottom of the window is reached. This gives a soft 3D look with a satin appearance if there is sufficient contrast between the two colors. This also has the affect of slightly darkening the application's appearance compared to using the Flat Tile selection.



**Flat Tile** - This selection will paint most windows with the color selected for Window Background. This results in a brighter, flat window appearance that resembles the newer 'Tile' themes implemented in mobile and desktop devices.



**Reset Signal Colors** - Click this button to reset any Signal colors that do not match the current color theme. Normally, changing the theme will also change a signal's colors. However, if you have customized a signal's color, then it will not change with theme changes. To reset signal colors, click this button and select an option from the menu that appears. To reset a specific signal's colors without changing other signals, use that signal's editor instead.

**Cancel** - Discards any selection changes, restores options to previous settings and closes the window.

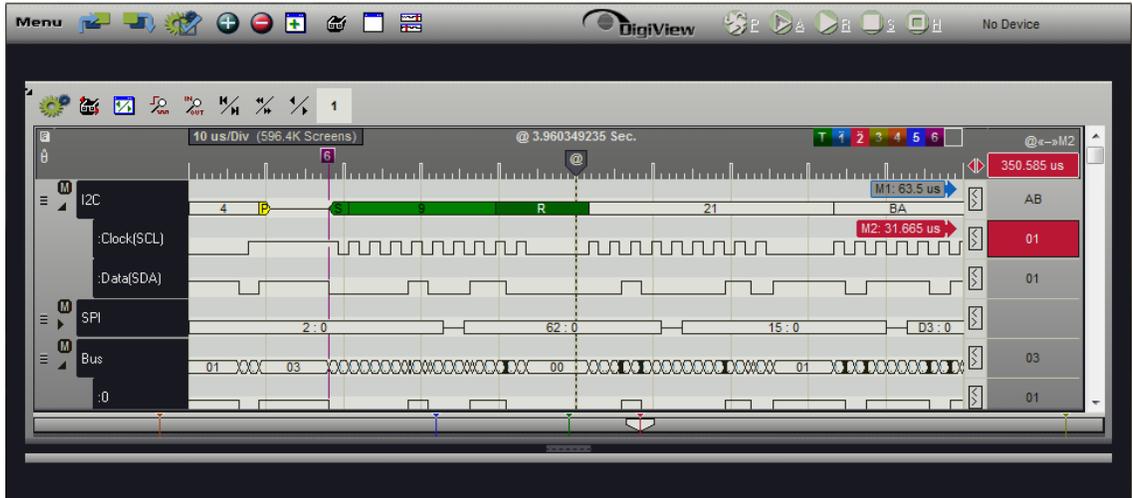
**OK** - Accepts all changes and closes the window.

#### Related Topics:

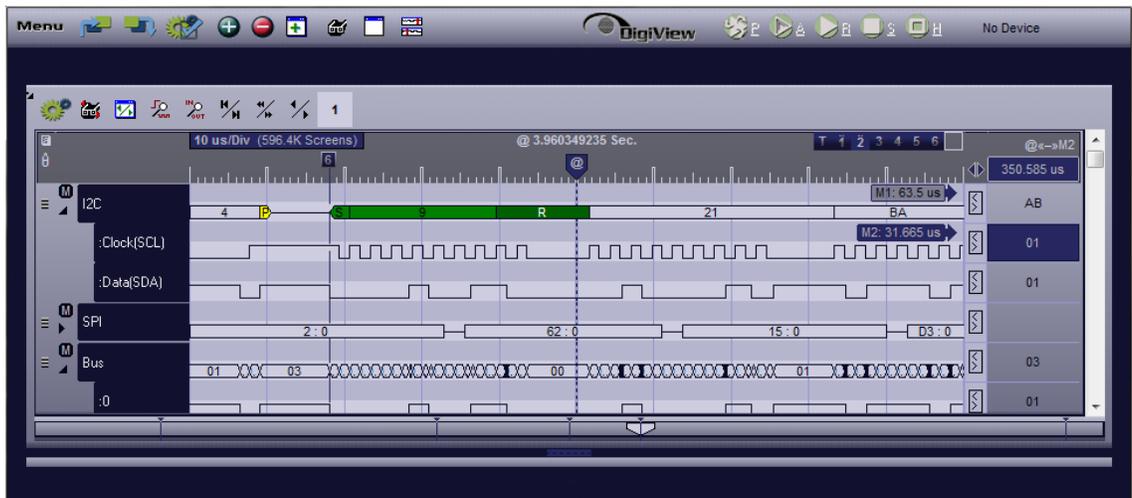
- [Theme Examples](#)<sup>[103]</sup>
- [Custom Theme](#)<sup>[109]</sup>

### 3.5.1 Theme Examples

#### Slate



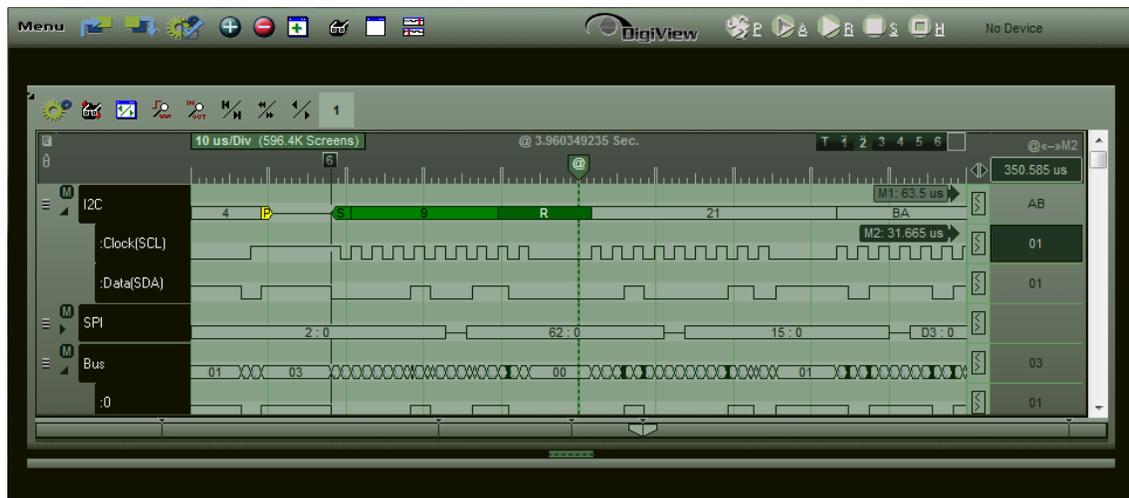
#### Steel Blue



### Dusk

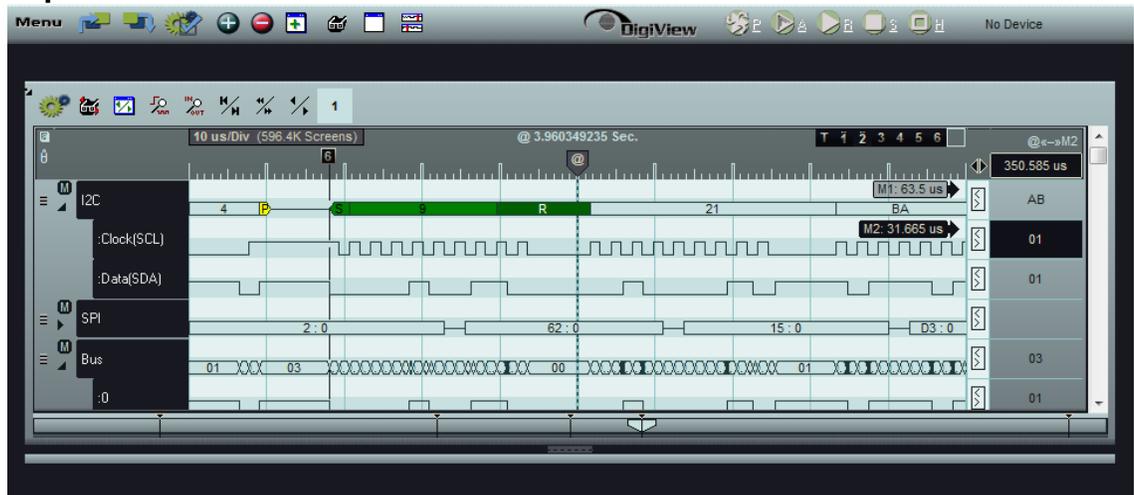


### Moss

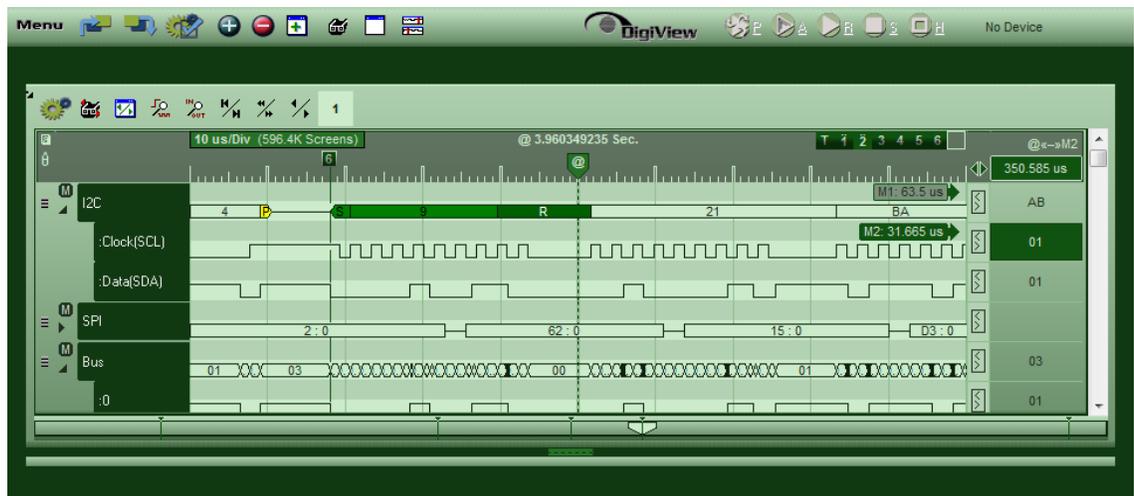




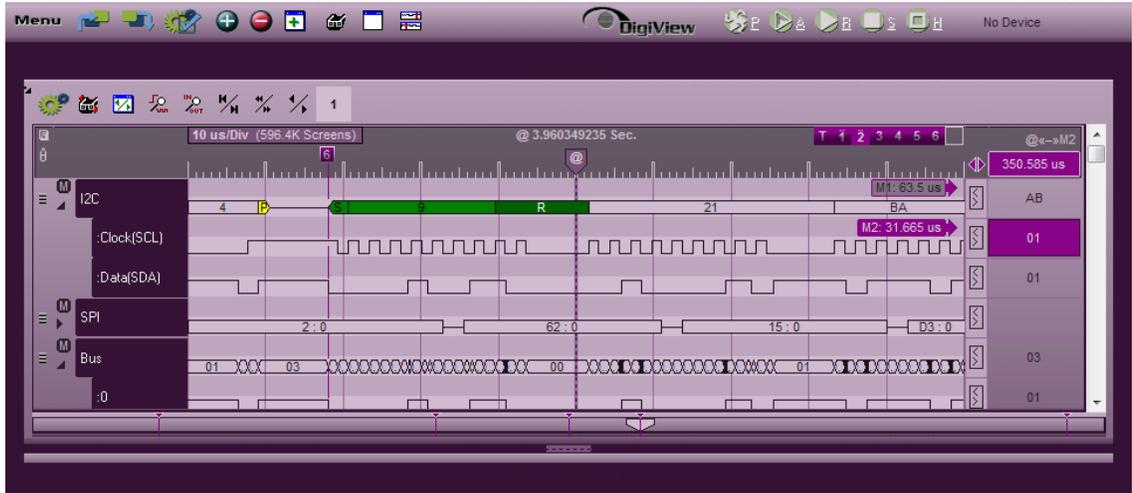
### Turquoise



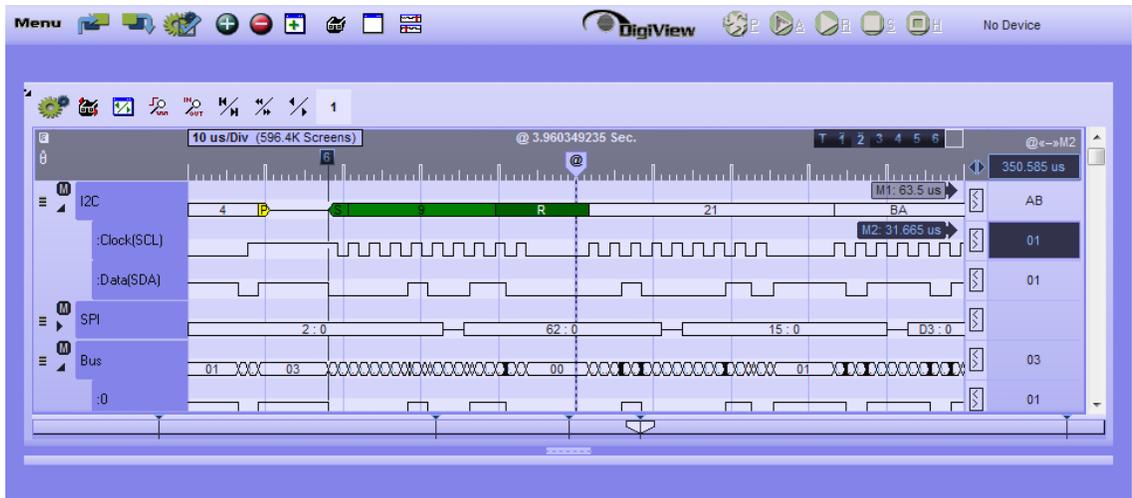
### Lime



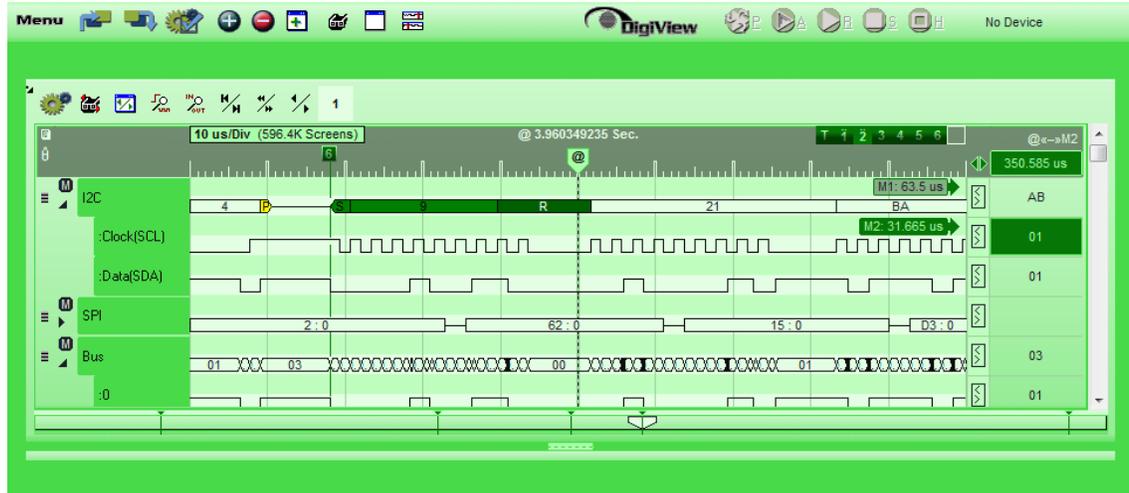
### Violet



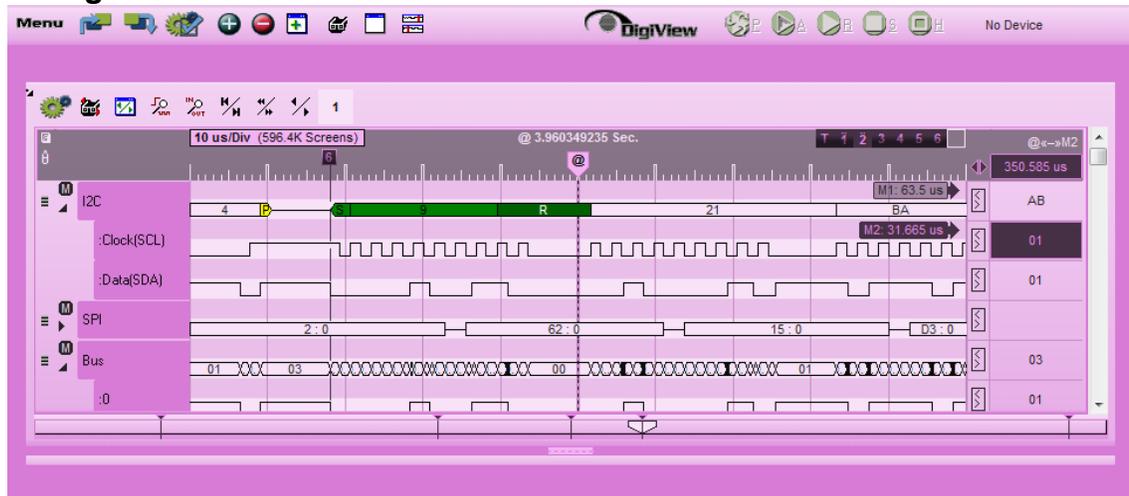
### Neon Blue



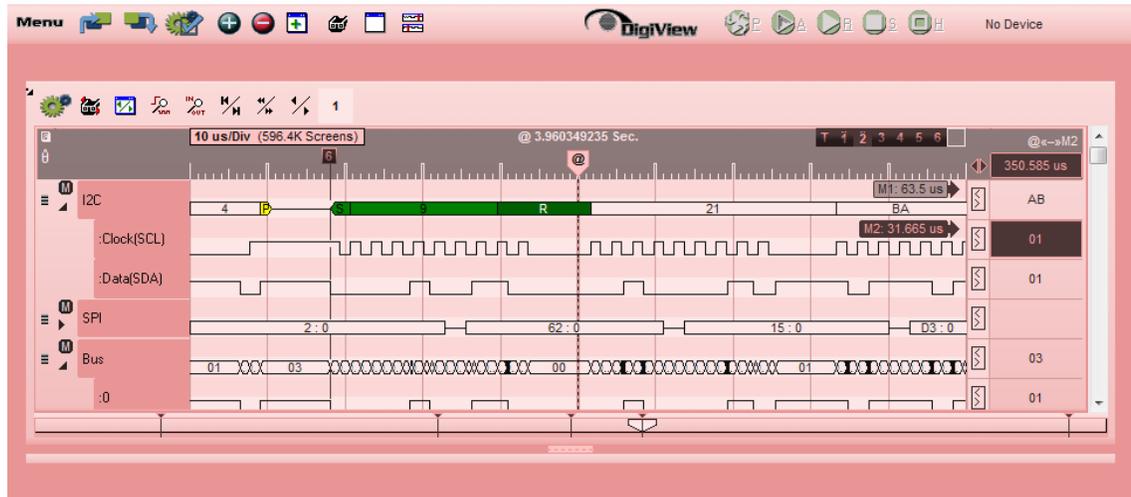
### Neon Green



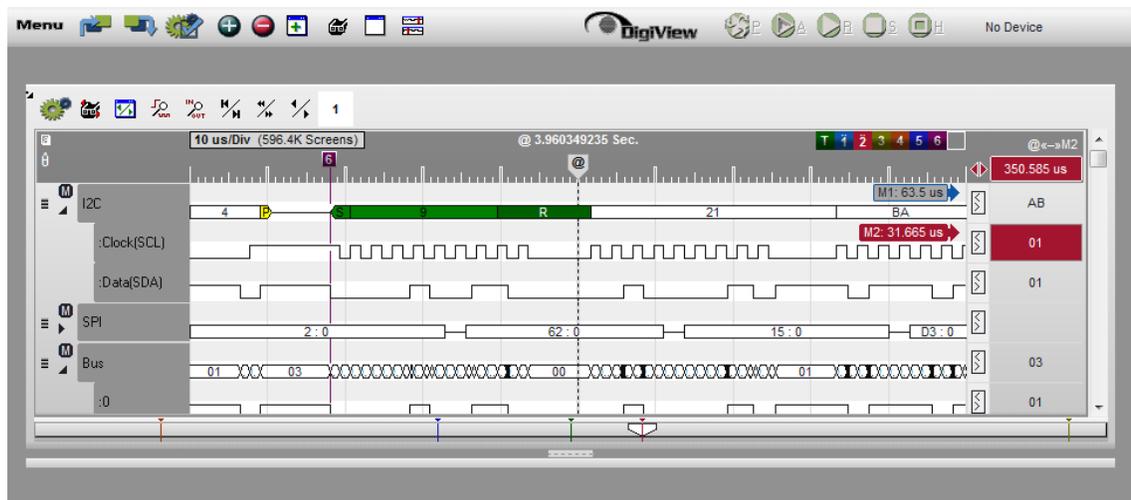
### Flamingo



## Peach

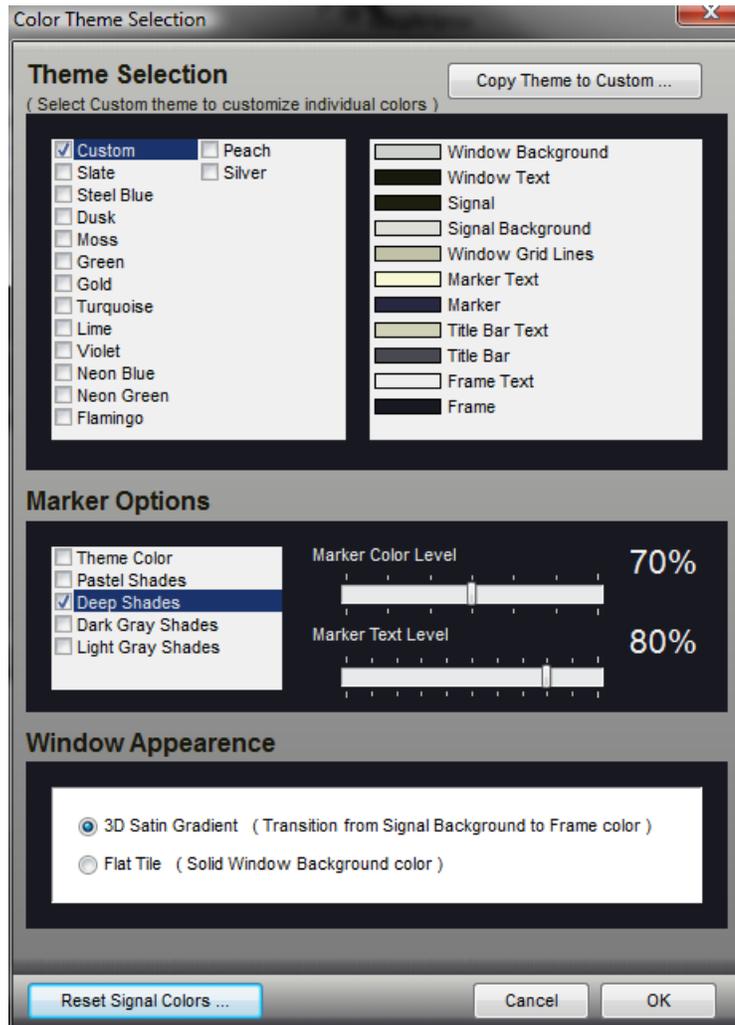


## Silver

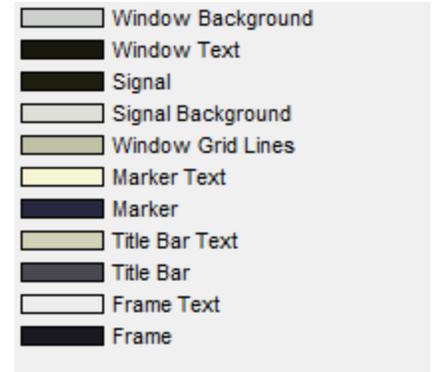


### 3.5.2 Custom Theme

To create a completely custom color theme or to slightly change an existing theme, select the "Custom" option in the Theme Selection list. When Custom is selected, the color for individual theme items can be changed to fit your preference.



Click on the item to change after Custom has been selected.

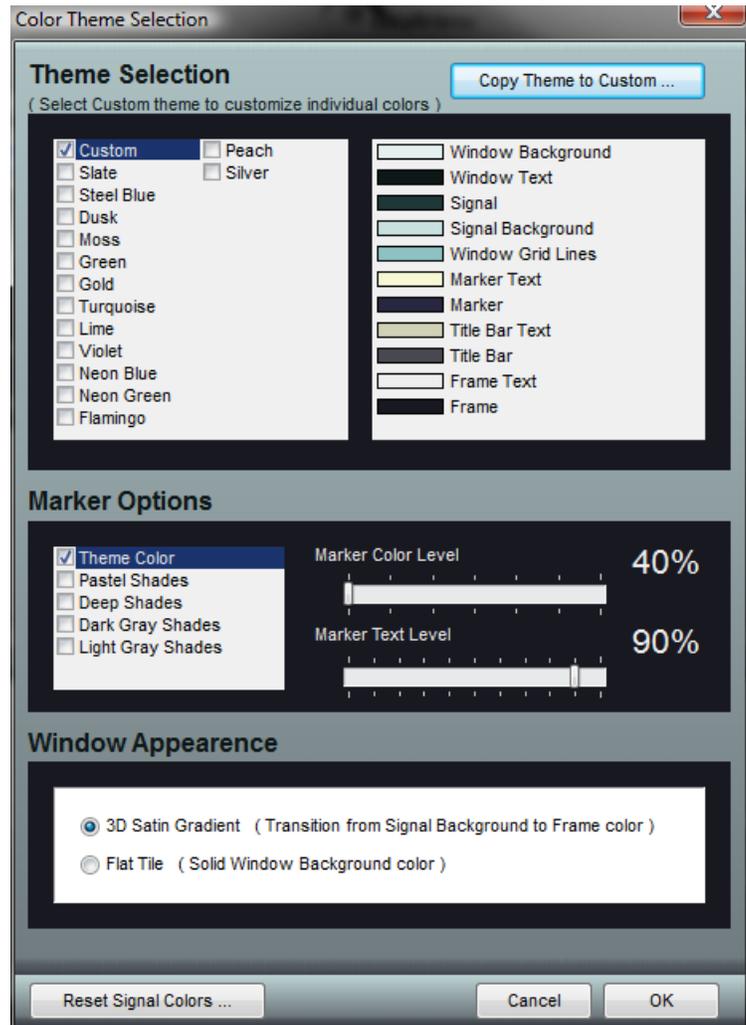


see ([Using the Color Selector](#)<sup>112)</sup>)

To start with colors from a particular theme click the "**Copy Theme to Custom**" button and select the theme to copy the settings from...

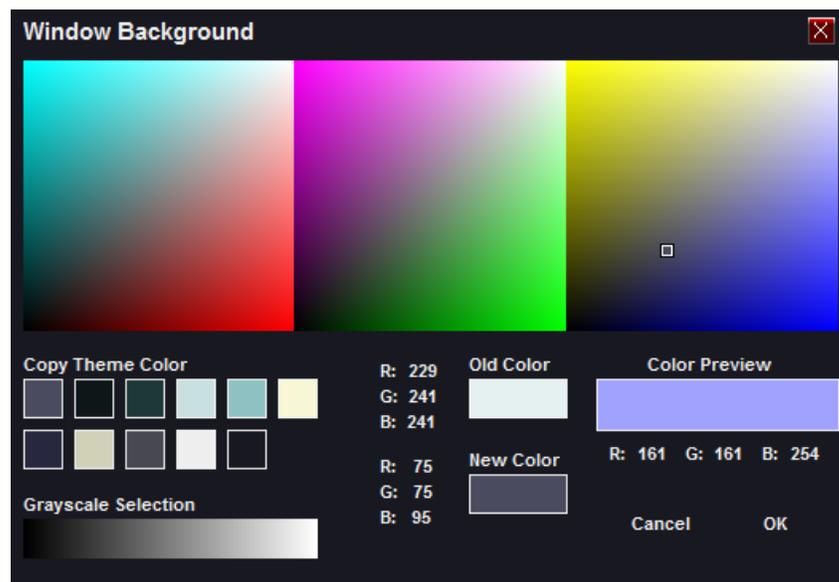


All settings from the selected theme will be copied into the Custom Theme. This includes all marker configurations that were previously used in the theme.



## 3.6 Using the Color Selector

DigiView's color selection dialog uses live updates while selecting colors so the results can be seen without closing the dialog. The original color can be restored at any time by canceling the operation. Additional features include selecting from a grayscale range from full black to full white, selecting from any of the colors used in the current theme, reselecting the original color for the item being modified or a complete custom color. RGB values are displayed for the original color, the color being previewed and the newly selected color. Color Preview will update while the mouse moves over a selectable color. A square will highlight the selected color if it is present in the RGB and/or Grayscale gradient swatches.



### Restoring the Original color

Click on either the Old Color or New Color swatch or simply press the Cancel button if you also want to close the dialog.

### Selecting an existing Theme color

Clicking on any of the Theme color swatches will set the New color to match and update the color of all affected items in the application.

### Selecting from the Grayscale range

Clicking anywhere in the grayscale gradient swatch will select the color value under the mouse and update the color of all affected items in the application. Dragging the mouse in this area using a Left-Click will perform a constant color update.

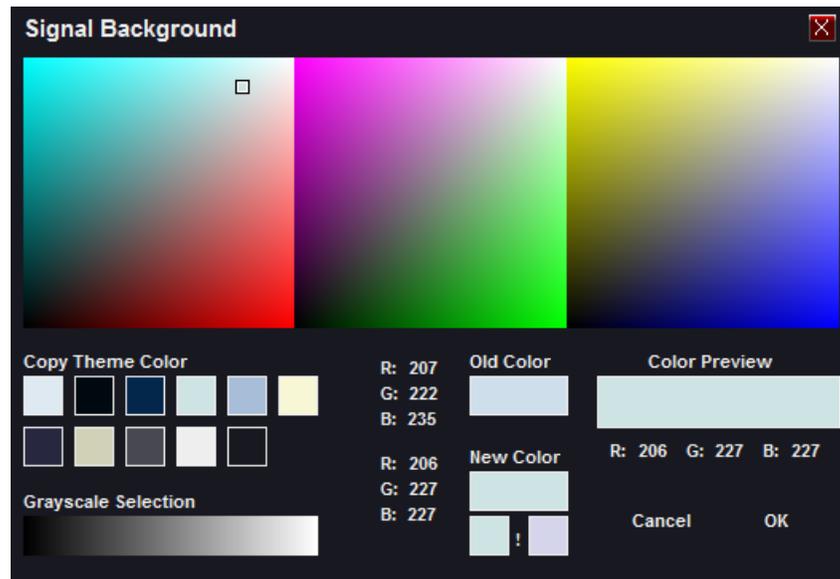
### Selecting a Custom Color from the RGB swatches

Clicking anywhere in the Red, Green or Blue gradient swatches will select the color value under the mouse and update the color of all affected items in the application. Dragging the mouse in this area using a Left-Click will perform a constant color update.

### Older Project Color Mismatches

If a custom color from an older project is selected for modification and a reasonable match can not be found in the dialogs' color range, two color swatches will appear just below the New Color

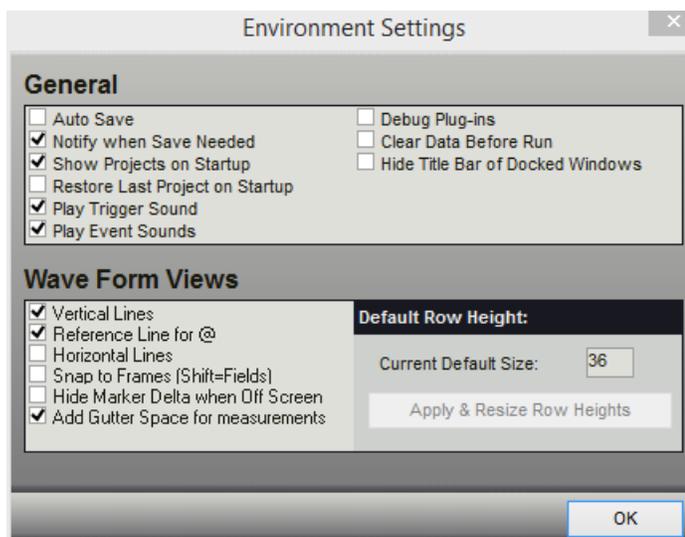
swatch. These two swatches represent the two closest matches to the original color that could be found in the current color range selections. Click on either of these swatches or choose a new color entirely. If the dialog is closed and the file is saved after making this change, the original color can not be restored.



### 3.7 Environment Settings



Several Environment options are available and can be accessed from **Main Menu-> Configuration-> Environment**.



## General

**Auto Save** - Select this option to automatically save the current file. All current settings and data will be saved to the file when exiting the program or opening another file. The "Notify when Save Needed" option is disabled when this option is enabled. (see also: [Project Operations](#)<sup>[20]</sup>)

**Notify when Save Needed** - Select this option if you want to be notified of unsaved changes before exiting the program or opening another file. The "Auto save" option is disabled when this option is enabled. (see also: [Project Operations](#)<sup>[20]</sup>)

**Show Projects on Startup** - Selected by default, this option presents a Choice of items to load when the software is launched. De-select this option to skip the [Project Selections](#)<sup>[21]</sup> window on startup. If disabled, the "Restore Last File on Startup" option will be enabled.

**Restore Last File on Startup** - Select this option to skip startup options and automatically load the last file used previously. If disabled, the "Show Projects on Startup" option will be enabled. If the last file used is missing when launching DigiView with this option enabled, then the Project Selections window will still open. A project must be opened or created for the software to operate.

**Play Trigger Sound** - Selected by default, this option causes the software to present an audible indication of Trigger events. In continuous run mode, the alert will sound only once on repeated trigger conditions. De-select this option if you do not want the audible alert. The Audible sound can be customized by using the Operating systems "Sounds" control applet.

**Play Event Sounds** - Selected by default, this option causes the software to present an audible indication of any Snap or Scroll events. De-select this option if you do not want the audible alert. The Audible sound can be customized by using the Operating systems "Sounds" control applet.

**Debug Plug-ins** - Select this option to have the DigiView software pause when loading a custom plug-in. A message dialog will open and DigiView execution will wait until you close the dialog. This provides a means for the developer to attach the DigiView process to an external debugger before the plug-in module begins to execute.

**Clear Data Before Run** - Select this option to clear the display of all captured data when the Run or Auto Run button is pressed. This does NOT clear the captured data file but merely clears the display, replacing any presented data with "No Data" until new data is loaded.

**Hide Title Bar of Docked Windows** - This option toggles the visibility of the title bar of all docked windows. This is useful to preserve space in the docking areas or to eliminate unneeded labels for a cleaner user interface. The title of the docked window is always available by moving the mouse over the window's menu button.

## Wave Form Views

**Vertical Lines** - Check this option to display vertical lines at the time divisions in the Wave Form views.

**Reference Line for @** - Check this item to display a vertical line at the time reference marker (@) of the Wave Form views.

**Horizontal Lines** - Check this option to display a horizontal line beneath each visible signal in the Wave Form views. This may be desired to help determine the state of multiple Boolean signals when zoomed in at maximum resolution.

**Snap to Frames** - Check this option to snap to frames by default and use the shift key to snap to fields. If unchecked, the default is to snap to fields and use the shift key to snap to frames. This option affects all marker and signal snapping features of the waveform view.

**Hide Marker Delta when off screen** - When a marker is snapped or dragged to a new position, or when a marker is split into two markers (marker complement), a time measurement is displayed from the last position to the new position or between the marker pair. This is the Marker Delta. When the time points of the Marker Delta are off screen, the measurement is still visible on the edge of the Waveform View in the direction of the Marker's position. Check this option to hide this measurement when the Delta points are not in the viewing area of the Waveform View.

**Add Gutter Space for measurements** - When selected, the height of each row will be increased to accommodate an empty space reserved just for measurements. This provides room above a signal's waveform to display any measurements (Instant, Quick, Marker), keeping the waveform visible at all times. This setting is ignored when a signal is configured for plotting.

**Reset Row Height** - Click the "Apply" button to reset the heights of all signals in the Wave Form displays to the value entered as the Current Default size. Edit the current value to enable the "Apply" button.

# Capturing Data

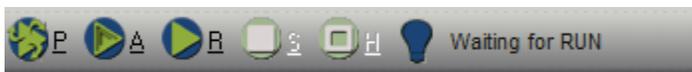
**Part**



## 4 Capturing Data

Once [signals](#)<sup>[31]</sup> and [triggers](#)<sup>[64]</sup> are defined, you can capture a new buffer of data at any time by pressing the 'Run' or 'Auto Run' buttons. If you tire of waiting on a trigger or the Analyzer triggers but you tire of waiting for its buffer to fill, you can manually STOP the capture to transfer the buffer. When transferred to the screen, the capture is also stored in the capture history for later analysis (based on [Acquisition settings](#)<sup>[97]</sup>).

If you have little or no activity after the trigger condition and find the need to manually halt the capture frequently, you may want to set a timeout period for automatic halt and transfer (see [Acquisition settings](#)<sup>[97]</sup>) or reduce the Analyzer's buffer size (see [Analyzer Buffer](#)<sup>[88]</sup>).



**Preview** - This mode will automatically transfer data to the PC repeatedly even if a trigger condition has not been defined. This mode is very useful to Monitor signals while making connections and only utilizes a small portion of the hardware buffer. In this mode, the buffer size and duration of data collection is adjusted automatically to provide a "peek" of the logic activity and is not intended for normal data analysis. The result is a virtual "LIVE" mode that does not try to search the data (Auto Search windows) or store the data in the capture history. The data displayed will be discarded when the results of a normal Run (single shot) or Auto Run are displayed.



**Auto Run** - This will "ARM" the hardware, wait for the trigger condition, automatically transfer the data to the PC when the buffer is full and automatically re-arm to repeat the process until the Stop or Halt button is pressed. If you are waiting on a Trigger condition that you expected to occur, you can select the "Stop" button to view the data already collected in the pre-fill portion of the hardware buffer (see [Analyzer Options](#)<sup>[88]</sup>).



**Run** - This will "ARM" the hardware and automatically transfer the data to the PC when the buffer is full. If you do not want to wait for a long capture, you can select the "STOP" button to force a transfer of the current data captured. If you are waiting on a Trigger condition that you expected to occur, you can select the "Stop" button to view the data already collected in the pre-fill portion of the hardware buffer (see [Analyzer Options](#)<sup>[88]</sup>).



**Stop** - This will halt the capture and transfer whatever was captured to the PC for your analysis.



**Halt** - This will reset the hardware and abort the capture without changing the data currently being analyzed. When the halt button is pressed, no data is transferred to the screen or the Capture History.

When you click on 'Run' (or Auto Run), you are actually arming the trigger circuit. Upon trigger, the hardware allows the buffer to continue past the pre-fill point and to continue filling up (post-fill). Once the buffer is full, it is transferred to the PC. After the buffer is transferred, the hardware immediately resets and begins pre-filling in preparation for the next RUN. In Auto Run mode, the next Run starts automatically.

**Capture related topics:**

- [Hardware Status](#)<sup>[119]</sup>
- [Capture History](#)<sup>[120]</sup>
- [Status Window](#)<sup>[122]</sup>
- [Capture Troubleshooting](#)<sup>[123]</sup>

**Note that the DigiView hardware is always capturing and storing data in a circular queue.**

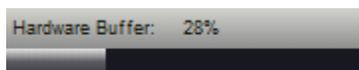
While you are looking at the last capture, the hardware is pre-filling the buffer to the pre-fill size selected. When the buffer reaches the pre-fill setting, the hardware continues capturing and storing data in a circular queue fashion so that the most recent data is always available while waiting on the trigger condition.

(see also: [Acquisition Options](#)<sup>[97]</sup>, [Analyzer Options](#)<sup>[88]</sup>, [DigiView Compression](#)<sup>[201]</sup>)

## 4.1 Hardware Status

The lower right corner and the upper right corner of the main window display Hardware Status information. This information will keep you informed of the hardware's buffer usage and capture state.

### Buffer Usage



The hardware buffer's usage is displayed as a bar graph and numerical percentage indicating the used portion of the buffer. As data is stored in the buffer, the bar and the percentage will increase. When the buffer reaches 100%, the data will be transferred to the PC for analysis.

The buffer may take mere milliseconds to fill or up to months to fill depending on the signals defined (see: [Signals](#)<sup>[31]</sup>) and the amount of activity on those signals. If you have configured the buffer's prefill option to 'forced' (no early trigger), the buffer indicators may appear to stall. This is correct behavior when very little or no signal activity is present or when the analyzer is waiting for the trigger condition.

During a "waiting for Trigger" period, the analyzer continues to capture and store the newest data in the prefill portion of the buffer, while discarding the oldest data. Once the trigger event occurs, the buffer will stop discarding the oldest data, keep the newest data (the prefill portion) and continue to capture until the buffer is full (see: Enforce Prefill in [Analyzer Options](#)<sup>[88]</sup>).

To clear the Analyzer's internal buffer, click anywhere in the Hardware Buffer Usage indicator.

### Analyzer State

The upper right corner of the [Top Tool Bar](#)<sup>[7]</sup> will display the current state of the Analyzer using a "light Bulb" symbol and a short text message (next to the run buttons), while the lower right corner will display the state of the hardware as simple LED indicators with a letter abbreviation for a reminder.

#### Message Example:



The "Light Bulb" is lit, indicating that a trigger event occurred. The current status is "Post-Filling", indicating that the remainder of the buffer is being filled with post-trigger data.

### Indicator Example:



The Status LEDs above indicate that the unit is powered, a trigger event has occurred and the remainder of the buffer is being filled with post-trigger data. Descriptions of each LED are provided below.

**P Powered** - The analyzer has been detected and is powered.

**H Halted** - The analyzer is 'IDLE' or waiting for a RUN command.

**P Pre Filling** - The analyzer is capturing data and filling the 'Pre-Fill' portion of the buffer.

**A Armed** - The analyzer is Armed and actively looking for a trigger condition.

**T Triggered** - The analyzer detected a trigger event.

**P Post Filling** - The remaining portion of the buffer is being filled with post trigger data.

**F Full Buffer** - The buffer is full (normally only active for a split second).

**X Transferring** - The analyzer is transferring the compressed buffer to the PC (normally only active for a split second).

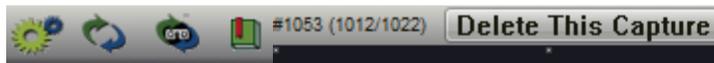
The typical progression of the status indicators is from left to right.

## 4.2 Capture History

As data for a project is captured and transferred to the PC, it is stored on the Hard Drive as a history buffer and maintained according to the settings configured in Acquisition Options. Each project maintains its own history buffer in a sub folder using the same name as the project file. However, the project file does not require the history buffer to be present when opened. This allows the project file to operate as a 'stand-alone' file for sharing or archival purposes. When saving the project file, the currently loaded capture will be the data stored in the project (see also: [Acquisition Options](#)<sup>[97]</sup>).

### History Browsing

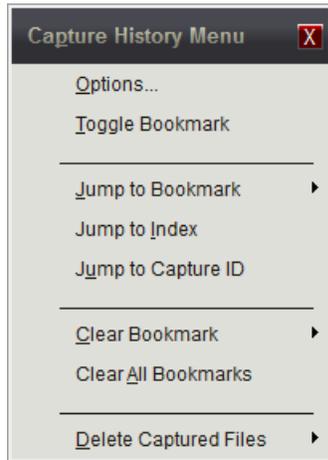
The history buffer can be accessed utilizing the History Menu, the Browse button or the bar graph. These items are located at the bottom of the main window. When browsing the history, the data for that history item will be loaded and all Signals, Auto Searches, Lists, Tables, etc. will refresh as if the data had just been captured.



### Menu Button

Click the Menu button to display the Capture History Menu:





### Browse Button



A Left-Click or Right-Click on the browse button will load the previous or next item in the history buffer. Holding the mouse down will repeat the action in the same direction, causing an "Animation" of the history.

### Search History Button



Click this button to open the [Capture History Search](#)<sup>182</sup>. This allows a search of the entire capture history using any normal search displayed in the Global search or the Search Manager.

### Bookmark Button



Click the Bookmark button to toggle a bookmark for the current capture. If already bookmarked, then the bookmark is cleared.

### Bar Graph



Bar Graph Display Items:

- The triangle in the bar graph indicates the current position in the buffer.
- The small squares represent a bookmarked item which are also listed in the history's menu for quick access.
- The numbers in the top-left portion of the bar graph represent the [Capture ID](#)<sup>122</sup> Number, the Position of the current capture in the buffer and the Total number of captures stored (in that order).

Bar Graph Functions:

- Click on the bar graph to "jump" to different items in the history.
- Click and drag the mouse in the bar graph to display the history item number to be loaded when the mouse is released.
- Click on the "Delete This Capture" button to delete the currently loaded capture. Once

deleted, a capture is completely removed from the history and can not be restored.

**See Also:**

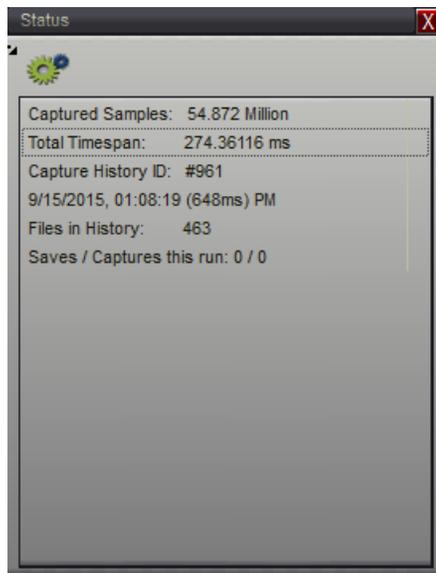
[History Searching](#)<sup>[182]</sup>

## 4.3 Status Window



To open a new Status Window, use the "Open Feature Window" button and select "Status" from the menu. Status windows can be docked, tabbed with other dockable windows or placed on any monitor (see [Window Arrangement](#)<sup>[94]</sup>).

The Status Window displays key statistics of the current capture being viewed, the Capture History and the last Analyzer Run. These statistics will be displayed for any capture in the history (when loaded for viewing) and for any new captures (whether stored in the history or marked for discarding).



### The Status window displays the following:

**Captured Samples** - Total number of samples stored in the loaded capture. Samples are always at the full configured resolution of the Analyzer. DigiView never down-samples or discards samples in a capture.

**Total Timespan** - The total time covered by the stored samples in the loaded capture, from the first sample to the last sample.

**Capture History ID** - A unique identifier is assigned to each capture and used for storage and bookmarking purposes. The ID of the loaded capture is displayed here. This ID is also used as the filename extension in the capture history sub folder.

**Data and Time of Capture** - The date and time (in millisecond resolution) is always stored when a capture is transferred to the PC from the Analyzer. This is the actual capture time and may not

always match the file date and time. This data is stored in each capture and can not be modified. Note: When opening older projects that did not store the capture date and time, this will display the project's data instead.

**Files in History** - The Capture History is stored in a sub folder using the Project's name. This is the total number of compatible captures located in this directory that have been indexed by the project. The history is re-indexed whenever the project opens, captures are deleted or an indexed capture file is missing (by manual deletion, drive corruption, etc). If a capture is discovered to be missing while browsing or jumping to its index, the closest chronological capture to the missing index will be loaded instead.

**Saves/Captures this run** - This statistic is updated whenever a capture is transferred to the PC or the Analyzer is halted and tracks the number of captures saved in the Capture History compared to the number of captures retrieved from the Analyzer since the Analyzer was last armed. Acquisition settings, Auto Search Settings and Plug-ins can determine when to discard or save a capture. Note: Preview data is not stored in the capture history.

## 4.4 Capture Troubleshooting

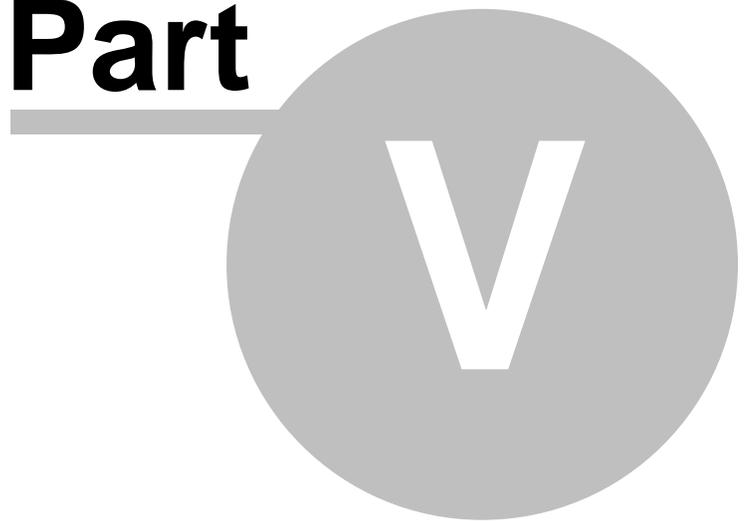
Symptom	Causes & Solutions
<p>1. DigiView (Models DV3100, DV3109, DV3200, DV3209 and DV3409) Power LED does not stay ON.</p>	<p>(A). The USB subsystem of the PC is turning DigiView Off due to a Bandwidth shortage.</p> <p>REMEDY: Remove other USB devices that use a port on the same hub (internal or external).</p> <p>(B). The USB subsystem of the PC is turning DigiView Off or DigiView is resetting due to insufficient power.</p> <p>REMEDY: If you are using an external hub, change to a POWERED external hub or purchase one of better quality that meets USB specifications.</p> <p>(C). The USB cable is not designed for High Bandwidth applications, causing communication errors.</p> <p>REMEDY: Replace the USB cable with one designed for the High Speed mode of the USB port.</p> <p>(D). The USB cable is connected to a case port that utilizes a low bandwidth cable internally, causing communication errors.</p> <p>REMEDY: Connect DigiView to a port located directly on the Motherboard (rear port of the case).</p>

Symptom	Causes & Solutions
<p>2. DigiView is only identified as a SERIAL device by the USB subsystem.</p>	<p>(A). The USB sub-system is experiencing a problem with corrupted or missing files.</p> <p>REMEDY: Look for a driver update to the USB hub (internal or external) or re-install its drivers. Refresh the DigiView drivers by re-installing the DigiView software.</p> <p>(B). Operating System or computer needs rebooted.</p> <p>REMEDY: Turn off the computer and re-boot the system.</p> <p>(C). The USB cable is not designed for High Bandwidth applications, causing communication errors.</p> <p>REMEDY: Replace the USB cable with one designed for the High Speed mode of the USB port.</p> <p>(D). The USB cable is connected to a case port that utilizes a low bandwidth cable internally, causing communication errors.</p> <p>REMEDY: Connect DigiView to a port located directly on the Motherboard (rear port of the case).</p> <p>(E). The DigiView hardware has been damaged.</p> <p>REMEDY: Call Technical Support for repair information.</p>
<p>3. One of DigiView's channels is connected to a transitioning signal, but the capture does not seem to show any activity or very little activity.</p>	<p>(A). The resolution of the Waveform View is too low or too high to see the activity.</p> <p>REMEDY: Zoom In or Out to see the details of the activity.</p> <p>(B). The signal has been defined with the wrong channel selected.</p> <p>REMEDY: Edit the signal definition and change the channel selection. The colors are repeated for each group of 9 channels, so be</p>

Symptom	Causes & Solutions
	<p>sure to select the correct one.</p> <p>(C). The signal definition has been "disabled".</p> <p>REMEDY: Edit the signal definition and uncheck the Disabled option. The channels for disabled signals will not appear in the captured data.</p> <p>(D). Bad Ground reference.</p> <p>REMEDY: Connect one of DigiView's ground wires (black probes) to a ground point as electrically close as possible to the signal connections.</p> <p>(E). Incorrect Trigger Threshold.</p> <p>REMEDY: The transitions will be undetectable If the trigger threshold is set too high or too low for the voltage range of the transitioning signal. Change the Threshold setting for the physical channel so that it is near the center of the signal's voltage swing.</p> <p>(F). Insufficient power or Communication error, see 1.B,1.C,1.D above.</p>

# Navigating and Analyzing the Data

**Part**



## 5 Navigating and Analyzing the Data

This is where you spend most of your time; trying to make sense of what you captured. You will find DigiView software very intuitive and easy to use but it is important to realize that **ZOOM operations occur about the CENTER of the screen**. The tools are all designed to take advantage of this fact to make you more productive.

The general paradigm is to find points of interest, bring them to the center of the screen and then ZOOM. We provide several methods of finding edges and bringing them to the center of the screen so that you can zoom in and out without having to constantly scroll to 'zero-in' on the point of interest.

### Navigation, Markers & Buttons:

- [Waveform Views](#) <sup>[127]</sup>
- [Toolbar Buttons](#) <sup>[130]</sup>
- [Mouse Functions](#) <sup>[131]</sup>
- [Signal Snap Column](#) <sup>[135]</sup>
- [Marker Snap and Value Column](#) <sup>[136]</sup>
- [Bird's-Eye Scrollbar](#) <sup>[138]</sup>
- [Marquee Zoom](#) <sup>[139]</sup>
- [Using Markers](#) <sup>[139]</sup>
- [Key Functions](#) <sup>[148]</sup>

### Measurements:

- [Instant measurements](#) <sup>[150]</sup>
- [Quick measurements](#) <sup>[153]</sup>
- [Dynamic Measurement Window](#) <sup>[157]</sup>
- [Marker Time/Delta Window](#) <sup>[161]</sup>

### Viewing the Data in Time-Relative Columns (Tabular Views):

- [Table Windows](#) <sup>[163]</sup>
- [List Windows](#) <sup>[166]</sup>

### Linking Views into Time-Relative Groups:

- [Using Link Groups](#) <sup>[171]</sup>

### Searching the Data:

- [Search Overview](#) <sup>[172]</sup>
- [Define Searches](#) <sup>[172]</sup>
- [Searching](#) <sup>[178]</sup>
- [Search Manager Windows](#) <sup>[179]</sup>
- [Search Types](#) <sup>[179]</sup>

## 5.1 Waveform Views

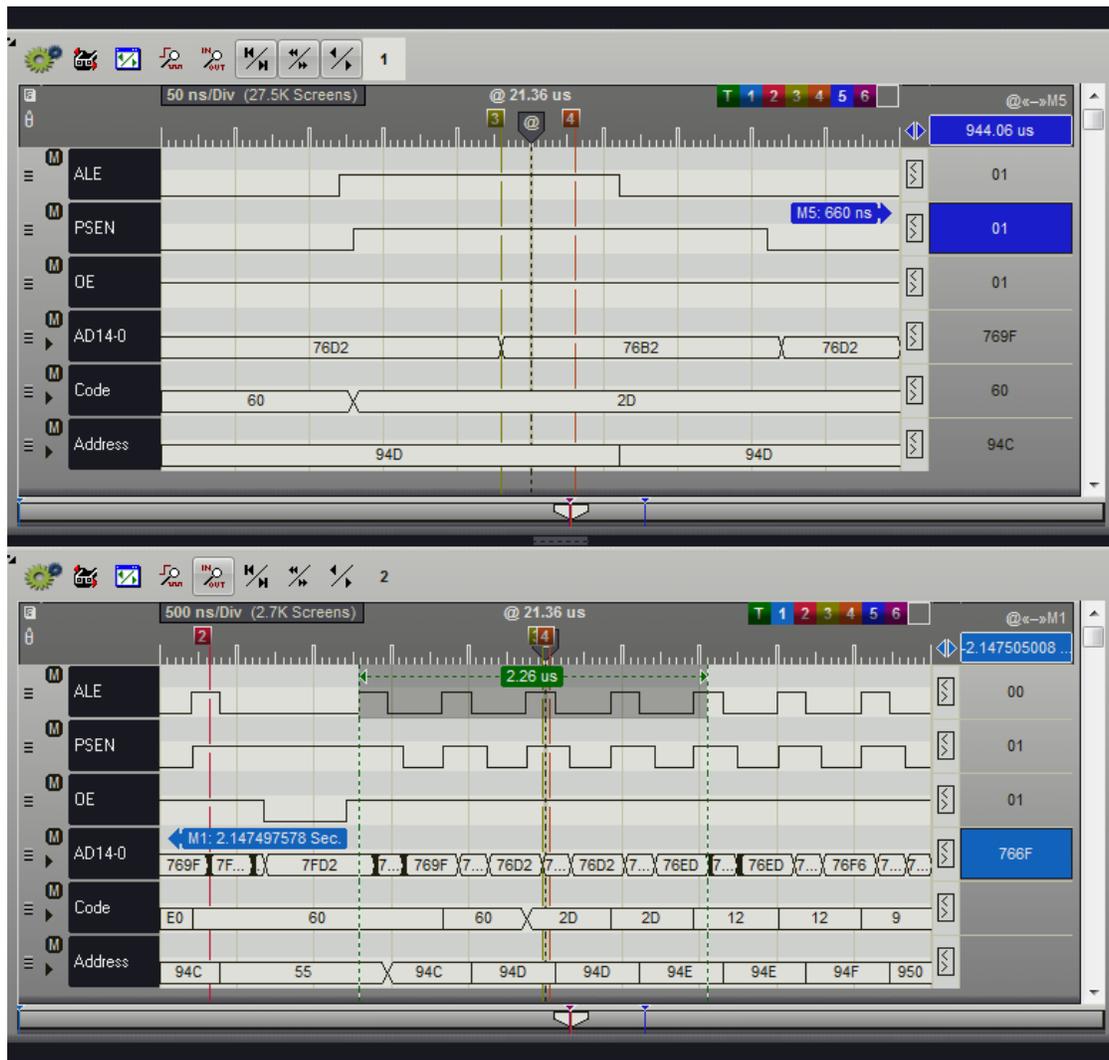
Waveform views are the central focus of navigating and analyzing the huge amount of captured data. In a waveform view you can Zoom quickly to different resolutions, snap to edges or beginning of packets, drop markers, take measurements and more.

### Waveform View Details

- [Toolbar Buttons](#) <sup>[130]</sup>
- [Mouse Functions](#) <sup>[131]</sup>
- [Signal Snap Column](#) <sup>[135]</sup>
- [Marker Snap and Value Column](#) <sup>[136]</sup>
- [Bird's-Eye Scrollbar](#) <sup>[138]</sup>
- [Marquee Zoom](#) <sup>[139]</sup>
- [Using Markers](#) <sup>[139]</sup>
- [Key Functions](#) <sup>[148]</sup>

### Waveform Overview

The main application window has two Waveform Views permanently placed in the center. Additional Waveform Windows can be added and docked or positioned independently on any monitor (multiple monitors are supported). The Primary and Secondary waveform views are shown below.



The Center Time Bookmark (center time reference) is considered "Center" because all operations center around this point and the 'Center time' displayed at the top of the Time Division area refers to its position. In the top Graphic above the Center Time is 21.36us and the bookmark is seen directly beneath it. Although it designates the center of operations, the bookmark can be moved left or right of center to suit your preference. The '@' reference point can be repositioned by moving the mouse over it until the special cursor appears, then click and drag it.



To open an additional Waveform View, use the "Open Feature Window" button and select "Waveform View" from the menu. Unlike the primary and secondary Waveform Views, these additional Waveform Views can be docked, tabbed with other dockable windows or placed on any monitor (see [Window Arrangement](#)<sup>[9]</sup>).

### Waveform View Function Summary

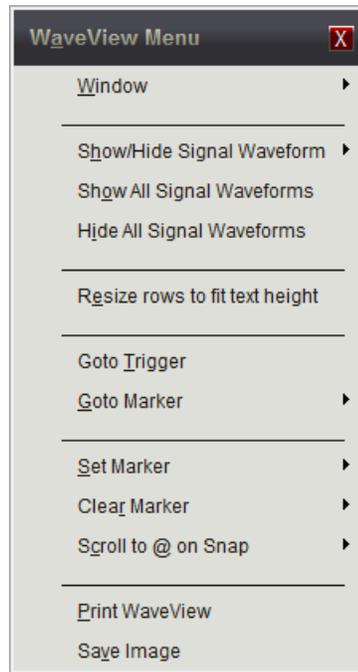
- View multiple signals in time correlation.
- **Expand** Multi-Channel Signals to see individual channel waveforms by using the " + " symbol to the left of the signal name.
- Individually reverse **Expand Order** of Multi-channel signals by menu.
- **Collapse** expanded Multi-Channel Signals by using the " - " symbol to the left of the signal name.
- **Zoom** in or out for more or less resolution.
- Single button **Zoom Max** resolution or **Zoom Min** resolution.
- **Marque to Zoom** function.
- **Scroll** by a single division or **Page** multiple divisions.
- **Free Scroll** vertically and horizontally by a Right-Click Drag.
- **Link** both Waveform Views at the center time for **Synchronous Scrolling** regardless of each view's zoom level. (see: [Using Link Groups](#)<sup>[17]</sup>)
- **Drop Marker** arbitrarily by Ctl-Drag or Drag & drop in the topmost row.
- **Snap Markers** to next or previous transition of a signal by Drag & drop. (see [Using Markers](#)<sup>[139]</sup>)
- Snap Markers to next or previous transition and **Bring to Center** by Shift-Drag.
- **Snap Signal** to the next or previous transition by using the " < , > " indicators to the right of the signal.
- **Arbitrary Snap to center** and **Edge Snap to center** by a Left-Click anywhere on a signal.
- **Set, Clear** or **Jump** to markers.
- **Signal Row Order** can be re-arranged by dragging.
- **Signal Format** can be set to ASCII, Binary, Decimal, HEX or Octal.
- Independently select which signals to view in each Waveform View.
- **Edit Signal Properties** by menu or Left-Click on the signal's name. (see: [Signal Editors](#)<sup>[33]</sup>)
- **Print** current Waveform View or **Save as JPEG**. (see: [Printing](#)<sup>[194]</sup>)

### Waveform Menus

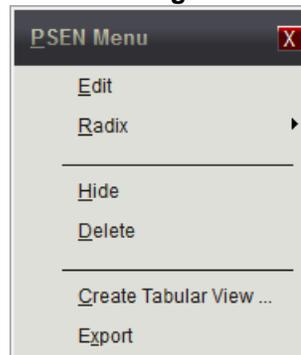


To access the main waveform menu, click its menu button (highlighted above). To access a Signal's menu, Right-Click on a Signal name or click on its menu button. Examples of these menus are displayed below.

**Waveform Menu:**



**Waveform Signal Menu:**



**5.1.1 Toolbar Buttons**

We make extensive use of the right mouse button. Most functions have naturally paired operations. Most paired functions are natural opposites (like left/right, in/out, first/last, previous/next). We take advantage of this symmetry to double up the functions of most buttons and other clicks. This not only reduces desktop usage but also results in more natural, easier to remember functions.

For example, rather than having both a SEARCH LEFT and SEARCH RIGHT button, we have a SEARCH button. Left clicking the button will SEARCH LEFT; right clicking will SEARCH RIGHT.

After only a few minutes of use, this becomes much more natural than using separate buttons. Switching directions involves pressing different mouse buttons rather than moving the mouse to a new button in the application. All buttons in the tool bar above the Waveform View are dual-function except the Menu button and Link Group indicator. Additionally, you will find that left and right clicking in Waveform Views on the "<" and ">" symbols, Marker column and various other areas will perform similarly paired functions.



**Tool Bar Detail**



**Menu**

Opens the Waveform View menu using either the Left or Right mouse button.



**Search**

Left Click - Search Left and scroll to previous match using selected Global Search  
 Right Click - Search Right and scroll to next match using selected Global Search

### **Previous View / Next View**

Left Click - Navigate backward in the waveform view's Scroll & Zoom history.  
 Right Click - Navigate forward in the waveform view's Scroll & Zoom history.

### **Zoom In/Out Max**

Left Click - Zoom IN ALL the way (Highest Resolution)  
 Right Click - Zoom OUT ALL the way (show ALL data)

### **Zoom In/Out**

Left Click - Zoom IN one step (more detail, more resolution) (hold to repeat)  
 Right Click - Zoom OUT one step (less detail, less resolution) (hold to repeat)

### **Scroll Start/End**

Left Click - Scroll to START of capture data  
 Right Click - Scroll to END of capture data

### **Scroll by 5**

Left Click - Scroll left by 5 divisions (1/2 screen) (hold to repeat)  
 Right Click - Scroll right by 5 divisions (1/2 screen) (hold to repeat)

### **Scroll by 1**

Left Click - Scroll left by 1 division. LEFT means to scroll the view window to an earlier point in time. (hold to repeat)  
 Right Click - Scroll right by 1 division. Right means to scroll the view window to a later point in time. (hold to repeat)

### **Toggle Instant Measurements**

Left Click - Toggle the visibility of Instant Measurements.

### **Link Group Indicator**

This indicates which link group the view is assigned to. The primary and secondary Waveform views are permanently assigned to Link Group 1 and 2 respectively. Any additional Waveform Views can be assigned to any link group.



A small arrow will be present in the lower right corner of the indicator if assignment is available. Left-Click on this indicator to change the group assignment (see [Using Link Groups](#) |177|).

## 5.1.2 Mouse Functions

The mouse is used heavily in Waveform Views. Using the mouse In these views you can perform a wide variety of functions that are summarized below.

### Place markers

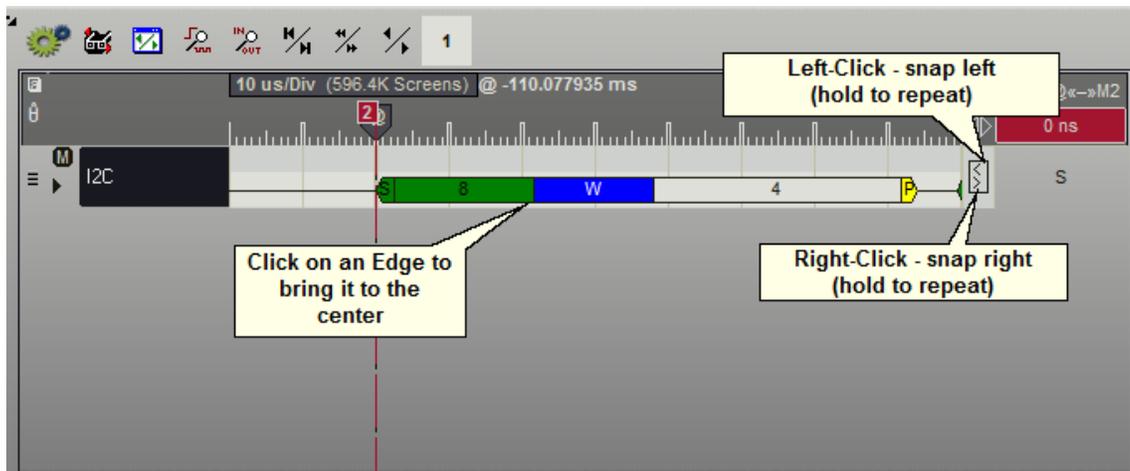
Drag and place markers or auto-snap to the next Signal change (see [Using Markers](#)<sup>[139]</sup>).

### Take Measurements

Select from a variety of measurement methods. View instant measurements while moving the mouse. Perform quick measurements between two points by using the middle mouse button or see the time between a marker's current and last position after snapping or dragging it (see [Measurements](#)<sup>[150]</sup>).

### Navigate

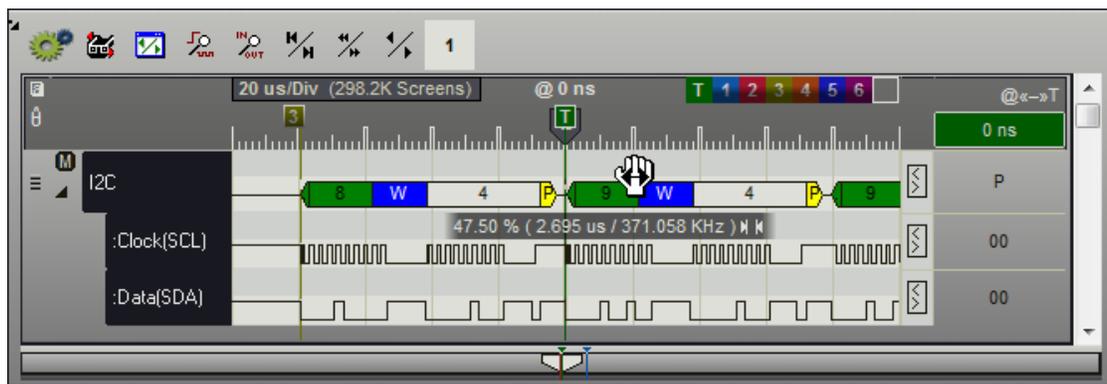
Click anywhere in a waveform to bring that point of time to the center of the screen. If you are within a few pixels of a change in the signal it will scroll to the center of the screen instead (Edge Snapping). Hold the CTRL Key when clicking near an edge to override Edge Snapping.



Scroll the the next or previous change of a signal to the center of the screen by using the button in the [Snap Signal Column](#)<sup>[135]</sup> at the end of the waveform.

### Drag Scrolling

Right-Click and Drag the mouse on a waveform to perform a 1:1 scroll in the horizontal direction. Right-Click and Drag the mouse vertically to scroll additional waveforms into view. Hand scrolling will not scroll vertically and horizontally at the same time so it chooses the direction based on the initial drag and displays arrows indicating the chosen direction. If you do not drag after using the Right-Click, the Waveform Menu will appear.



### Free Scrolling

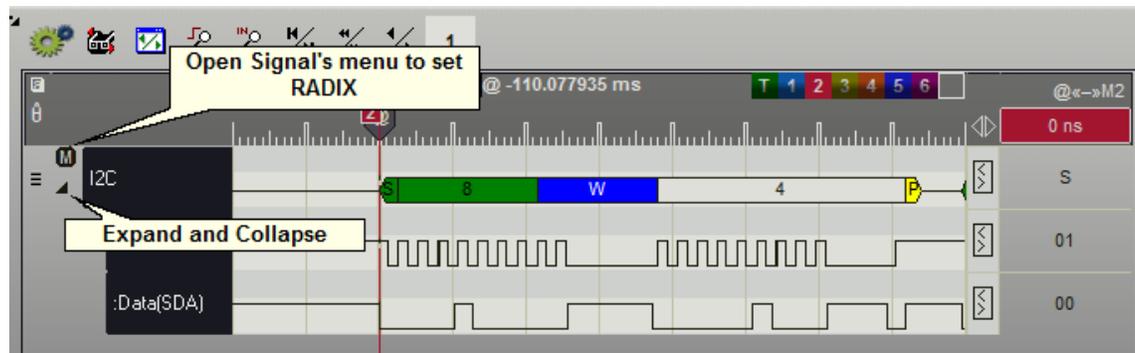
Along the bottom of each Waveform View is the [Bird's-Eye Scrollbar](#)<sup>[138]</sup> for seeing relative position, jumping to another position or scrolling freely in the data.

### ZOOM

Use the Mouse Wheel to change the Time per Division. Scroll the wheel forward to Zoom In (less time per division). Scroll the wheel backward to Zoom Out (more time per division). Time division changes in 1,2,5 increments (10ns, 20ns, 50ns, 100ns, 200ns, 500ns, 1us, 2us, etc).

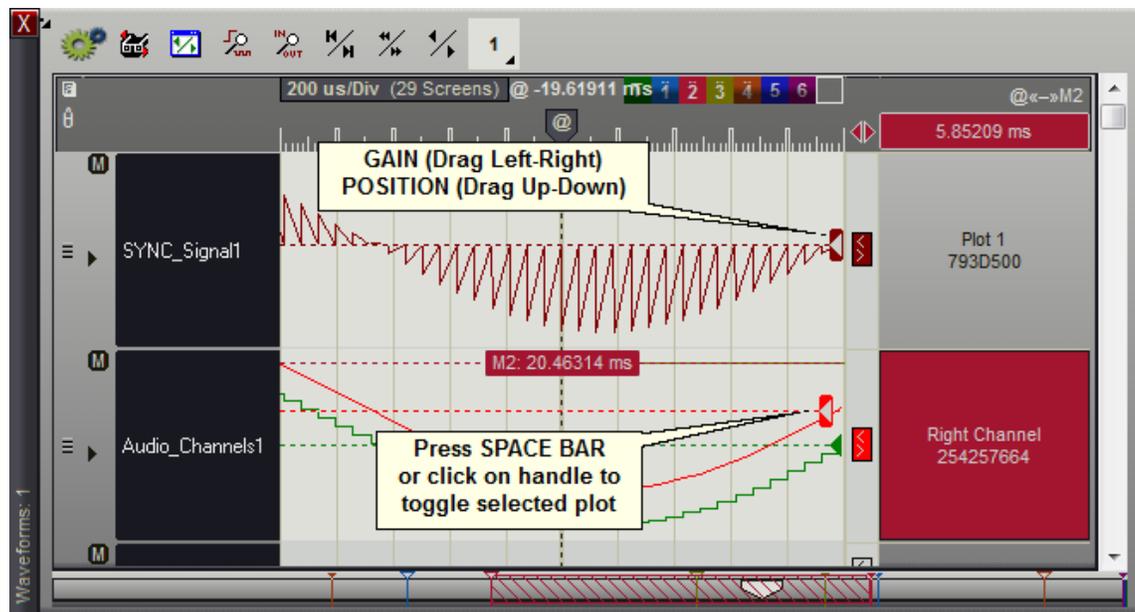
### Expand, Edit and Change Signal Radix

Expand a signal to see its individual channels or sub-signals using the small arrow to the left of the Signal Name. Click on the name to Edit the signal (see [Signal Editors](#)<sup>[33]</sup>) and use the Signal's menu button to change the Radix and Swap the order of the expanded signals.



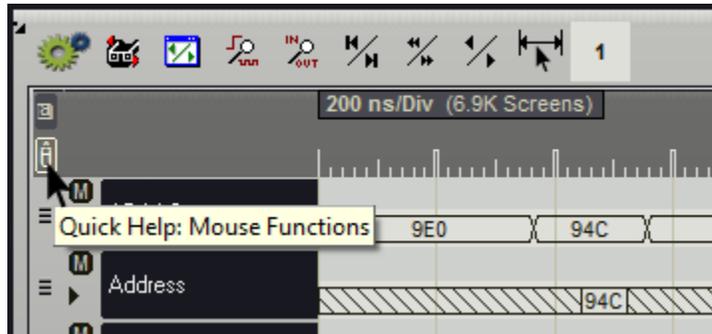
### Plot Handle

Set the gain and position of Plots by dragging the Plot Handle at the end of the waveform. To switch between plots use the Space Bar or click on the handle of the plot to switch to.



## Functions Organized by Mouse Button or Action

Click on the Mouse Help button to display a summary of the mouse functions available in the waveform views.



**Mouse Functions in Waveform Area:**

---

**Mouse Wheel / Middle Button Functions**

- Wheel Forward: Zoom In
- Wheel Backward: Zoom Out
- Click: Display Quick Measurements, snapping to near edges (use CTRL-KEY to override snapping, dismiss using any click)

**Left Mouse Button**

- Click: Move point or near edge to Center (@)
- Click-n-Drag: Marquee an area to Zoom
- Click-n-Drag on Marker: Move Marker, snapping to next edge in direction of movement (use CTRL-KEY to override snapping)

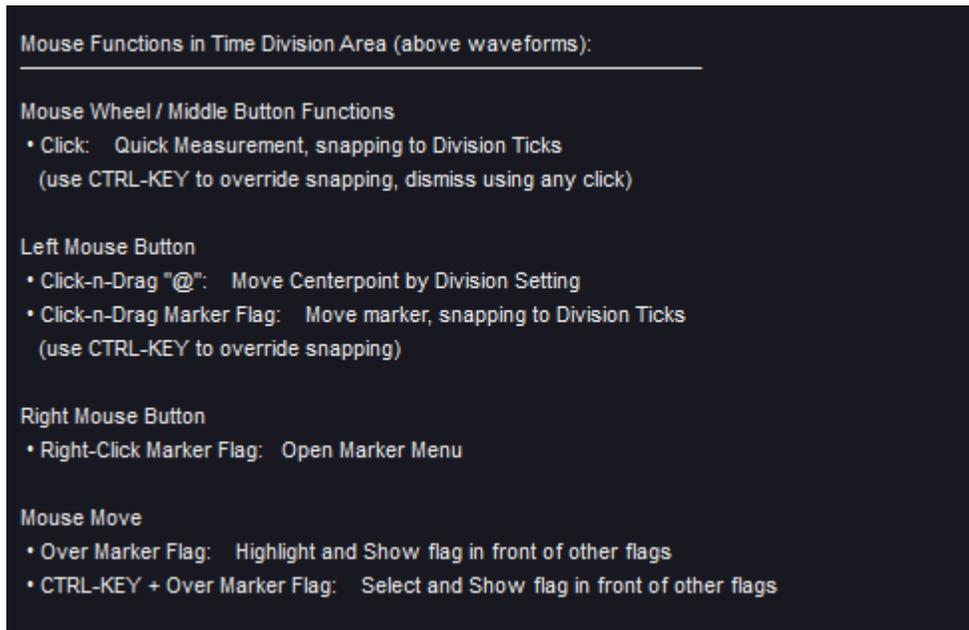
**Right Mouse Button**

- Click: Open the Waveform Window Menu
- Click-n-Drag: Scroll Horizontally or Vertically

**Mouse Move Over Signal**

Instant Measurement displayed, depending on Signal Type, Display Mode and Mouse Position

- Bool: Between Edges = Duration, On Edge = Duty(H or L) / Cycle Period / Cycle Frequency
- Bus: Between Transitions = Duration
- Other Decoded/Plugin: In Field = Duration, Between Fields = Frame Duration / Field Count
- Plotted: Value of selected plot at the mouse position



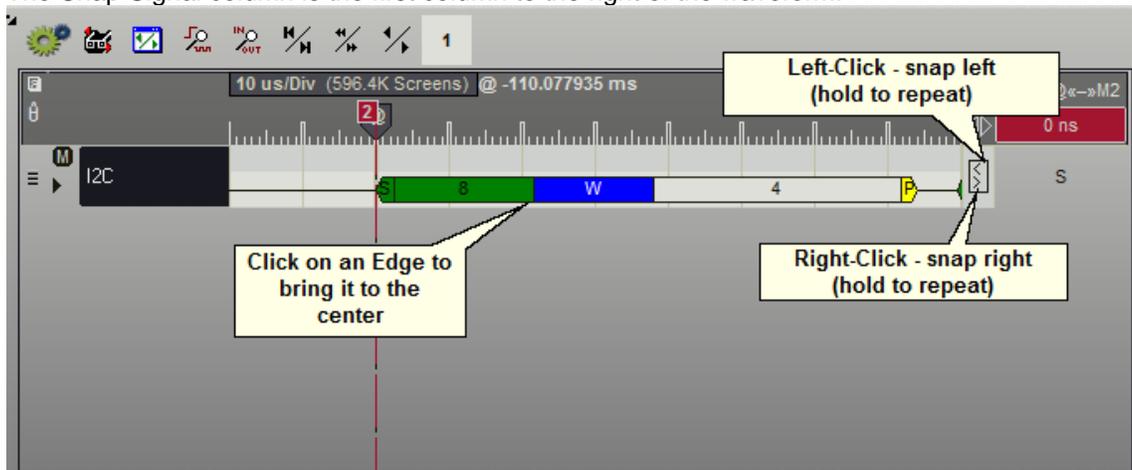
### 5.1.3 Snap and Value Columns

At the end of each waveform are two additional columns: The Snap Signal column and the Value/Marker Snap column.

#### Snap Signal Column

Scroll the next or previous change of a signal to the center of the screen by using the button in the Snap Signal column at the end of the waveform. Use the Left mouse button (Left-Click) to snap the previous transition into view. Use the right mouse button (Right-Click) to snap the next transition into view. The transition will scroll to the Time Reference point in the center of the screen (labeled '@' and visible under the red marker below).

The Snap Signal column is the first column to the right of the waveform:



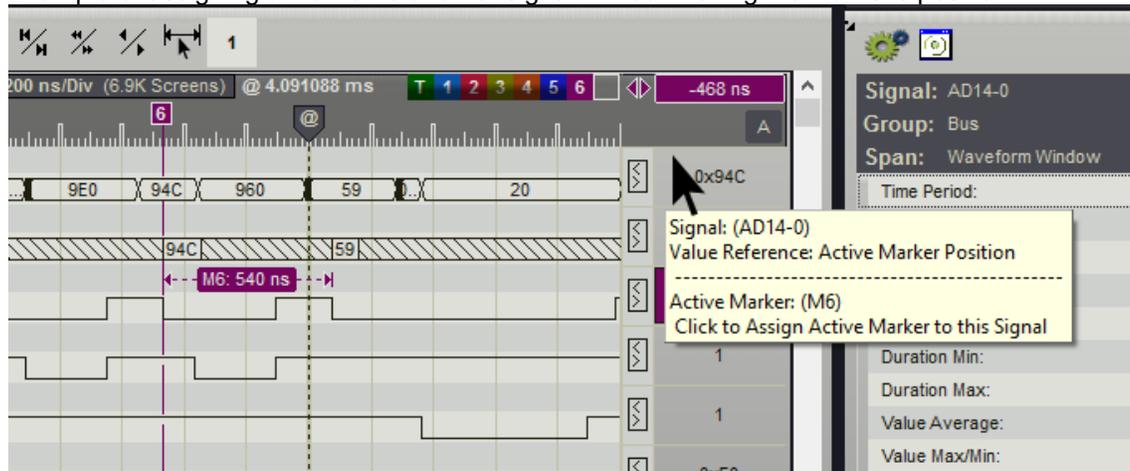
### Signal Value and Marker Snap Column

The Value/Marker Snap column has multiple functions and a local menu for configuration options. It is the last column in the Waveform view, just after the Signal Snap column.

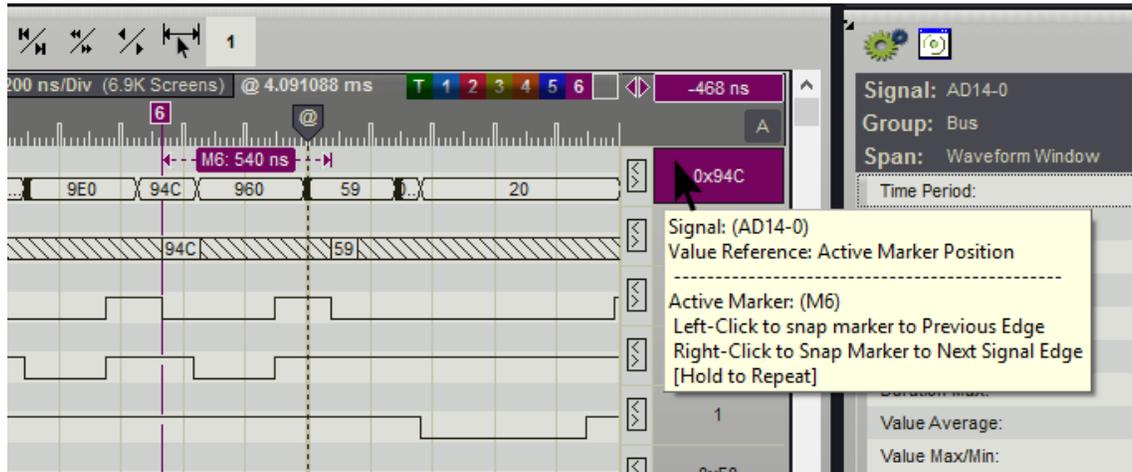
**Column features:**

1. Displays the value of each signal at the selected Time Reference (Time Source).
2. Displays which waveform is currently assigned to the selected marker (Active Marker) by using the marker's colors.
3. Is used to assign a different waveform to the Active Marker without changing the marker's position.
4. Is used to snap the Active Marker to the Next or Previous edge of the assigned waveform.
5. Indicates the position of the currently selected marker (Active Marker) relative to the screen's Center Time reference (marked by the movable '@' tag). This Delta measurement is displayed at the very top of the column using the same colors as the selected marker.
6. Indicates the Time Source selection (for the column's waveform values) on the Time Source button.

Example of assigning a marker to another signal without moving the marker's position:



Click once in the column to re-assign the marker to another waveform. Once assigned, any Left or Right click will move the marker to the previous or next edge of the waveform. Holding either mouse button down will repeat the function. If the marker's "scroll to @" function has been enabled, the waveform's new marker position will scroll to the Center Time reference point ( also see: [Using Markers: Marker Quick Menu](#)<sup>[141]</sup> ).

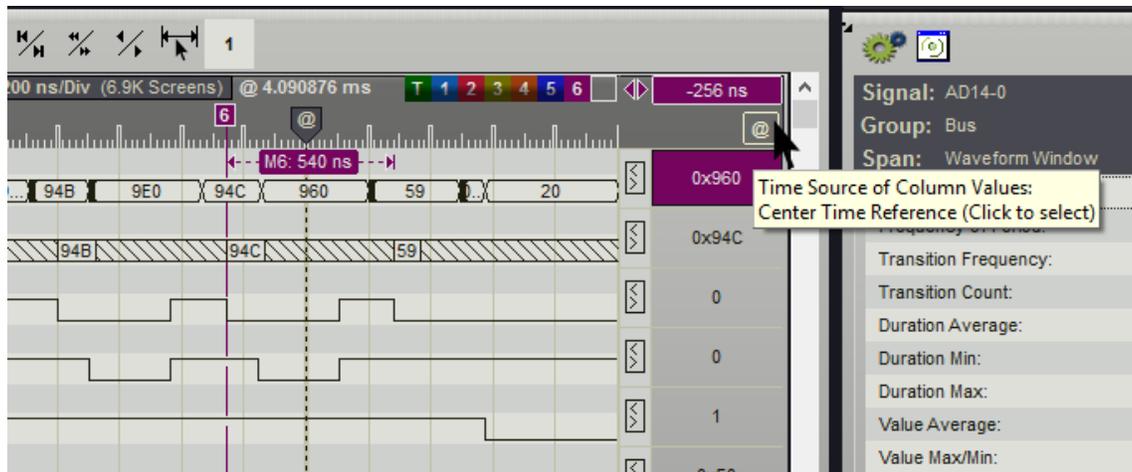


#### Time Reference Selections:

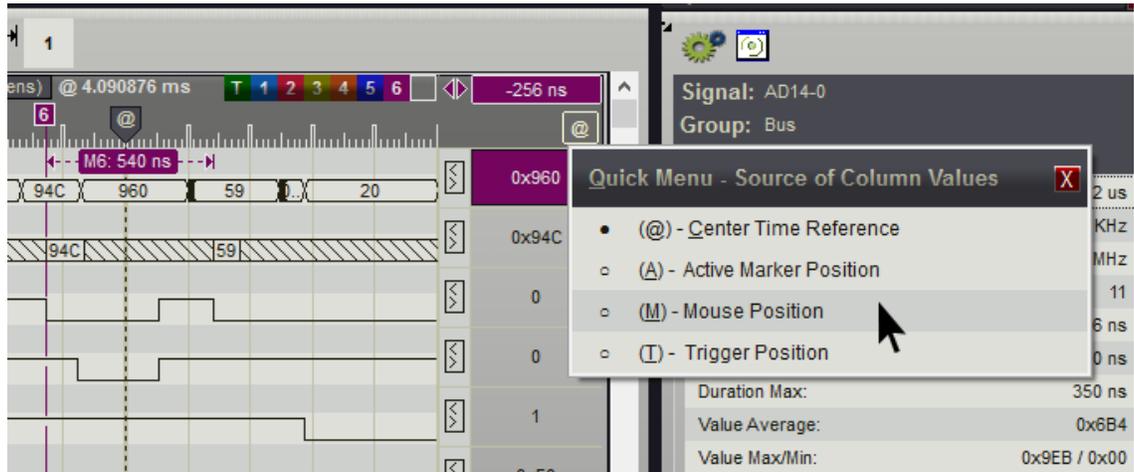
1. (@) - Center Time (the '@' indicator, live value update when jumping, snapping or scrolling).
2. (A) - Active Marker Position (live value update with marker movement).
3. (M) - Mouse Position (live value update with mouse movement).
4. (T) - Trigger Position (static, values of each waveform at time 0).

Click the Time Source button at the top of the value column (above the waveforms) to change the Time Reference for the displayed values. This button also serves as an indicator to remind you of the current setting.

In the images above, this button displays the letter "A", indicating the values displayed for each waveform are from the time corresponding to the Active Marker's position. In the images below, the button indicates a selection of "Center Time", which is the time corresponding to the screen's time reference (marked by the movable '@' tag).



Click on the Time Source button to open the selection menu and change the setting:



### 5.1.4 Bird's-Eye Scrollbar

The Bird's-Eye scrollbar gives you the really big picture. It shows the relative zoom and position of the waveform window to the total data. As you navigate through the data, you can look at the Bird's-Eye to see exactly where you are in the data and how fast you are progressing through it. You can also use it to scroll through the data, jump to another area or jump directly to a marker.

The total data is shown as a transparent box with an outline. When zoomed out, the portion of the data being viewed in the waveform window ("screen" area) is indicated by a rounded rectangle with vertical dividing lines corresponding to the 10 time divisions of the window.

Dragging the screen area of the bird's-eye will scroll the window view.



When the window is zoomed in on a small percentage of the data (usually the case) the waveform screen representation becomes a pointed tag with the point indicating the center of the screen in the total data ("you are here" indicator).



Each of the markers (and its complement if split) are also shown with color-coordinated lines. If the currently selected marker has been Split, the area between the marker and its complement is indicated with slanted slash marks in the color of the marker (see [Using Markers](#)<sup>[139]</sup>).

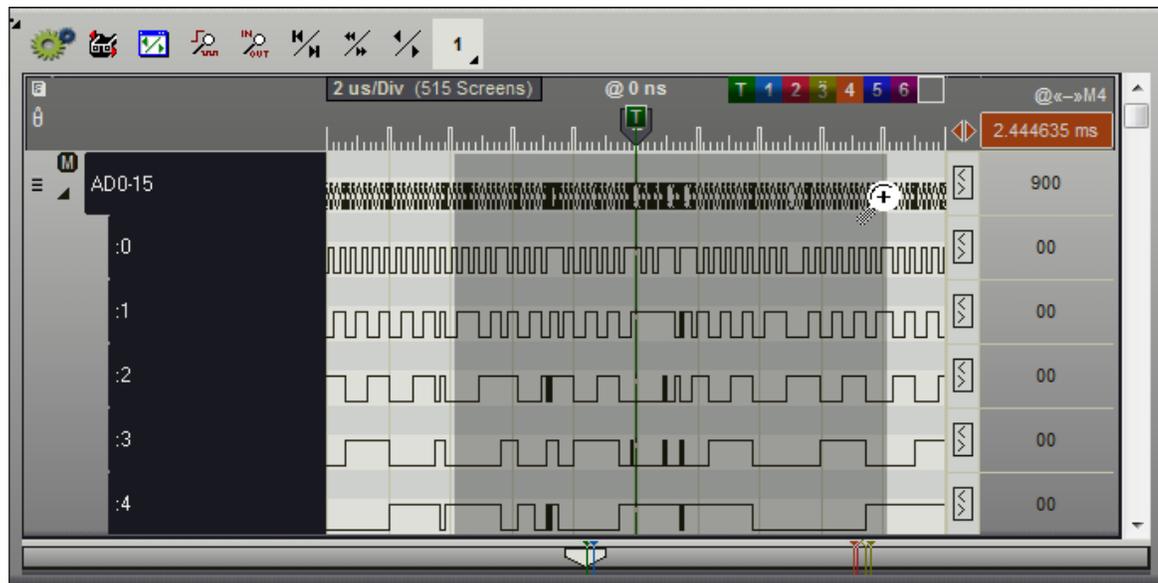


You can click on the Bird's-Eye scrollbar to jump to any position in the data. If you hold the CTRL Key while clicking near one of the markers, the waveform will "snap" to that marker's position. However, since the amount of time captured is so large compared to the available pixels on a monitor, you may not notice when several markers are represented by the same pixel. When several markers are represented by the same pixel the first represented marker will be chosen.

### 5.1.5 Marquee Zoom

You can use your mouse to marquee an area of data to zoom in on. Left-Click and drag to marquee a section. When you release the mouse button, the enclosed area will pan to the center of the screen and then zoom in as much as possible while keeping the entire area on the screen.

While holding the mouse button down to marquee, the area to zoom will darken. To cancel the marquee simply drag back towards the starting point until the darkened area disappears and release the mouse or drag completely away from the waveform area and release the mouse.



### Zoom History

 If you accidentally marquee, Left-Click on the "Previous/Next View" button to return to the previous zoom level and position. Hold the mouse button down to repeat the action and go to earlier zoom levels and positions. If you go too far, Right-Click on the button to go forward through the view history (hold to repeat).

### 5.1.6 Using Markers

Six main markers (M1 - M6) are provided and each of these markers can be split to form a marker pair (Main Marker + Complement), making a total of 12 markers available for measurement, bookmarking and other purposes. Complement markers are always displayed in the reverse color of their main marker and may also display a lower case 'c' after the marker number.

The benefits from using DigiView's markers start to become obvious when seeing the variety of available uses:

- Measure time from an edge of a signal.
- Measure time from the Trigger Point (also see [Marker Time/Delta](#)<sup>[16†]</sup>).
- Measure time from its complement marker or from any other marker (also see [Marker Time/Delta](#)<sup>[16†]</sup>).
- Bookmark specific spots in the capture and jump to those spots with a single click or keystroke (see [Quick Select Flags](#)<sup>[14†]</sup>, [Key Functions](#)<sup>[148†]</sup>).
- Bookmark a time span in the capture to quickly scroll and zoom that period into view with a

- Double-Click or keystroke (see [Marker Time/Delta](#)<sup>[161]</sup>, [Key Functions](#)<sup>[148]</sup>).
- Snap to the Previous or Next change in a signal and scroll that point to the Center of the screen (@).
- View the value of multiple signals at the marker's time in the Marker Column.
- Scroll a waveform vertically into view when activating its assigned marker.
- Mark a time span for exporting (see [Exporting](#)<sup>[186]</sup>).
- Automatically scroll to and mark the result of a [Pattern Search](#)<sup>[178]</sup> function or a specific stage of a [Sequential Search](#)<sup>[173]</sup> function (also see [Auto Search Windows](#)<sup>[180]</sup>).

The most convenient access to markers and their options is the [Quick Select Flags](#)<sup>[140]</sup> in Waveform Views. Perform single-click jumping, placement by dragging, splitting, clearing and activate marker menus from these flags.

Markers are global to the application, so any changes will be reflected throughout the program. The only exception to this rule is the marker that is currently active in a particular Waveform View. Each Waveform View maintains its own status of which marker is the local "active marker". Each signal's value that corresponds to the active marker's position in a Waveform View is displayed in the marker column.

### The Active Marker

The Active Marker is the marker currently being used or selected. Dragging a marker, jumping to a marker, changing its options or performing a search will automatically set the marker involved as the Active Marker.

Items affected in Waveform Views when a marker becomes the Active Marker:

- Quick Select marker flag highlights.
- Marker Flag highlights and is brought in front of other flags.
- The Marker Column reflects each signal's value at the Active Marker's time.
- The time displayed at the top of the Marker Column is the time from the Active Marker to the Center Time of the Waveform View (@).
- The time displayed at the top of the Marker Column is highlighted using the color of the Active Marker.
- The Snap Marker buttons at the top of the Snap Signal Column changes to the same color as the Active Marker.
- A right or left click on the Snap Marker buttons will snap the active marker to a signal edge if the marker is assigned to a signal.
- The static measurements will display for the active marker in full color and on top of any other visible marker measurements.
- When the Active Marker is moved or snapped to an edge it will display the time from its last position to its new position. If split, it will display the time from the position of its complement instead.
- If "Scroll-n-View" is enabled and the Active Marker is assigned to a signal, the assigned signal's waveform will scroll into view if not already visible.

### The Quick Select Flags

The Quick Select flags are located in the upper right corner of all Waveform Views. From these flags you can jump to a marker's position with a single click, place a marker, split a marker to create a tethered pair (creates the "complement"), clear a marker and open the marker menus.



These flags use the same colors as those defined for markers in the Color Theme. The active one is always highlighted as displayed for Marker number one above (referenced as 1 or M1).

**Dragging** from these flags will bring the marker to the current screen position and make it visible if necessary.

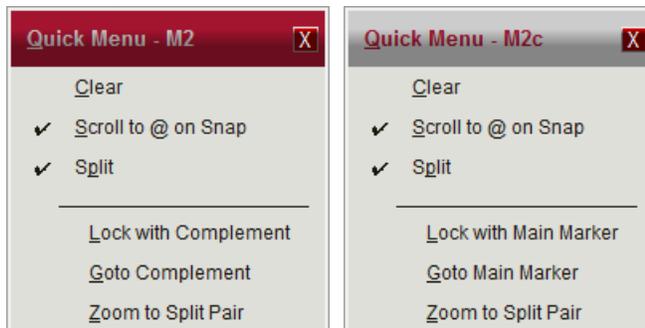
**Clicking** on one of these flags will automatically scroll the waveform view to the markers position and center it in the waveform window. This can also be referred to as "**Jump to Marker**".

The last flag (after the flag for M6) is a Global Flag that affects all markers. A Left-Click on this flag will clear all markers including marker complements. A Right-Click will open the [Global Marker menu](#)<sup>[142]</sup>.

## Quick Select Mouse and Key Functions

- **Left-Click** - Scroll the position of the marker to the Center of the screen (@).
- **Click-n-Drag** - Activates and brings the marker to the mouse when the drag begins. Position the marker for placement before releasing the mouse.
- **Right-Click** - Opens the Menu for this marker.
- **Ctrl Key + Click** - Scrolls to the position of the main marker's complement. If not already split, the marker will be split and the complement placed at the Center of the screen.
- **Ctrl Key + Click-n-Drag** - Activates and brings the marker's complement to the mouse when the drag begins. Position the complement marker then release the mouse when ready. If the main marker was not already split into the main/complement pair, it will automatically split so the complement can be brought to the mouse position when the drag begins.
- **Ctrl Key + Right-Click** - Opens the Menu for this marker's complement. If not already split, the marker will be split and the complement placed at the Center of the screen before the menu opens.
- **Mouse Move** - When the mouse moves over a flag, the associated marker's flags will highlight and display on top of other marker flags.
- **Ctrl Key + Mouse Move** - Activates the associated marker as the "Active" marker, but does not scroll to its position. The marker's flags will highlight and display on top of other marker flags.

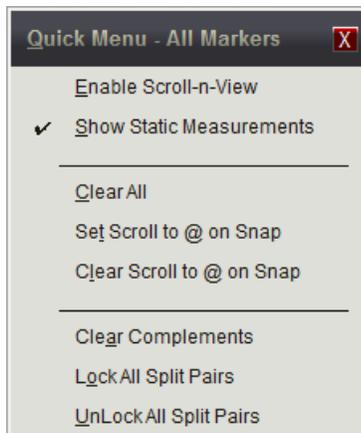
## Marker Quick Menu



Activate a marker's menu by a Right-Click on the Marker Flag. You can also use the Quick Select flags to activate this menu, but to access the menu of a marker's complement from the Quick Select flags, use CTRL-Key + Right-Click. The menu for M2 and the menu for it's complement are displayed above.

- **Clear** - Disables and removes the marker from view. If split, the complement is also cleared.
- **Scroll to @ on Snap** - Toggles the marker "tack" or "sticky" state. When enabled, the marker will always bring the point of placement to the center of the screen (@). This will occur whenever the marker is placed on a signal, dropped in the Division tick area or snapped to a signal's edge.
- **Split** - When enabled, the marker is split into a pair of tethered markers. We refer to the original marker as the Main Marker and the newly created marker as its Complement. When split, the static measurement for the marker will measure the time between the marker and it's complement instead of tracking it's last position. Quick select flags will have two "dots" above the marker number to indicate the split. The complement marker is always displayed in the inverted colors of it's main marker and has a lower case 'c' appended to its designator in many cases. Disable this option to clear the complement.
- **Lock with Complement / Main Marker** - This option is available after splitting a marker. Enable this option to lock the distance between a main marker and it's complement. Dragging, snapping or placing either marker will also move the other but the distance and order will remain the same. When locked, the Quick Select flags will connect the two dots above the marker number to indicate the pair is locked. Disable this option to unlock the pair and allow each to move independently.
- **Goto Complement / Main Marker** - This option is available after splitting a marker. Click this option to jump to the position of the other marker in the pair. If you opened the menu for the complement, you will jump to the location of the main marker.
- **Zoom to Split Pair** - This option is available after splitting a marker. Click on this option to bring both markers into view. First, the Waveform View will Zoom to a resolution that fits the time span of the marker pair, then it will scroll that time span to the center of the window (@). If the Center indicator (@) is not centered, drag it to the center to see both markers.

## Global Marker Menu



The Global Marker Menu affects all markers. The first two items are global settings that involve markers and the remaining items change the settings of the actual markers.

- **Enable Scroll-n-View** - Enable this feature to have a waveform scroll into view whenever you activate the marker last assigned to it. This can be beneficial if you are analyzing multiple waveforms that can not be viewed in the screen area at the same time and do not want to manually scroll each into view as you jump back and forth between them. If you are using the markers to jump to multiple time points, when you click on the marker the position will horizontally scroll to the marker and the waveform will vertically scroll to display the signal's waveform.
- **Show Static Measurements** - When enabled, marker measurements are always visible on the screen based on Environment options. Disable this option to temporarily hide these measurements (see [Environment Settings](#)<sup>[113]</sup>).
- **Clear All** - Click on this item to clear all markers including their complement. When cleared, the markers are no longer visible and each marker's options are reset.
- **Set Scroll to @ on Snap** - This will enable the "Sticky" function of all enabled markers. This can also be set independently for each marker by using the Marker Quick Menu.
- **Clear Scroll to @ on Snap** - Clears this setting for all enabled markers. This can also be set independently for each marker by using the Marker Quick Menu.

The remaining items are visible depending on the current settings of all enabled markers.

- **Clear Compliments** - If any enabled marker is split into the Main/Complement pair, the complement will be removed. This can also be done for specific markers by using its Quick Menu.
- **Lock All Split Pairs** - This will lock the distance between the Main/Complement pair of any split marker. This can also be done for specific markers by using its Quick Menu.
- **Unlock All Split Pairs** - This will unlock the distance between the Main/Complement pair of any split marker so that each half can move independently. This can also be done for specific markers by using its Quick Menu.

### Drag to Place

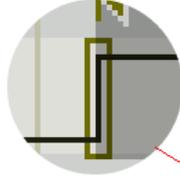
Simply click on a marker and drag it to the area of interest. You can grab the marker itself (the vertical line in the waveform area) or its 'flag'. When your mouse is in the capture zone for a marker, the cursor changes to indicate that it is over a marker. The cursor also indicates which marker will be selected, making it easier to grab a specific marker when they are very close together (or even on top of each other). If the marker is off-screen or not visible, use the Quick Select flags to grab the marker and place it.



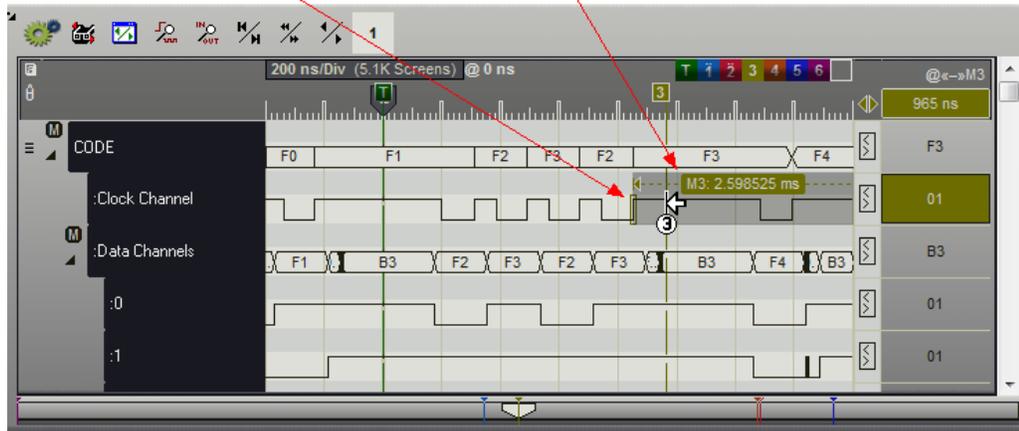
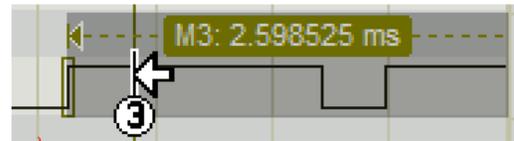
### Auto Snap

'Snapping' the markers to signal edges makes it easy to measure the time between them or to bring a specific edge to the center of the window. This operation is used so often that we optimized it by making it an automatic function. When you are dragging a marker and your mouse is over a waveform, the cursor changes to a 'snap-left' or 'snap-right' arrow. The direction of the arrow shows you which edge (previous or next) of this waveform the marker will 'snap' to if you were to drop it at that point. The arrow will point to the nearest edge or to the nearest edge in the direction of mouse movement, even if that edge is off-screen.

Proposed edge for marker placement if dropped



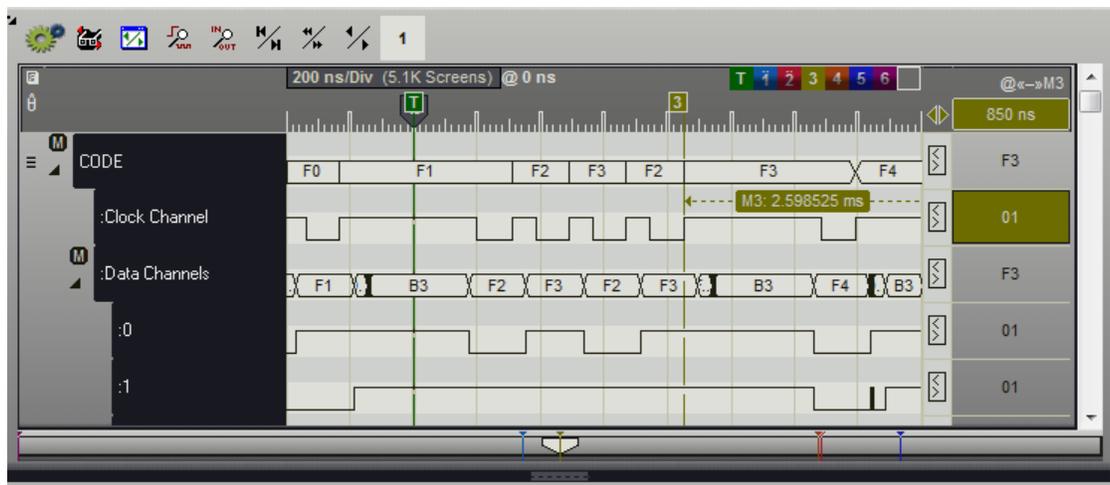
Time measurement from last position to proposed drop position



The time from the marker's last position is measured to the proposed drop point even if one or both points are off screen. In the graphic above, the marker's last position was off screen. Using the Quick Select flags we performed a marker drag on M3 and are moving it to the left over signal "CODE: Clock Channel". The snap indicator is drawn around the previous signal edge since we are moving to the left.

The Marker column changes to the marker's color indicating the marker is now assigned to that signal.

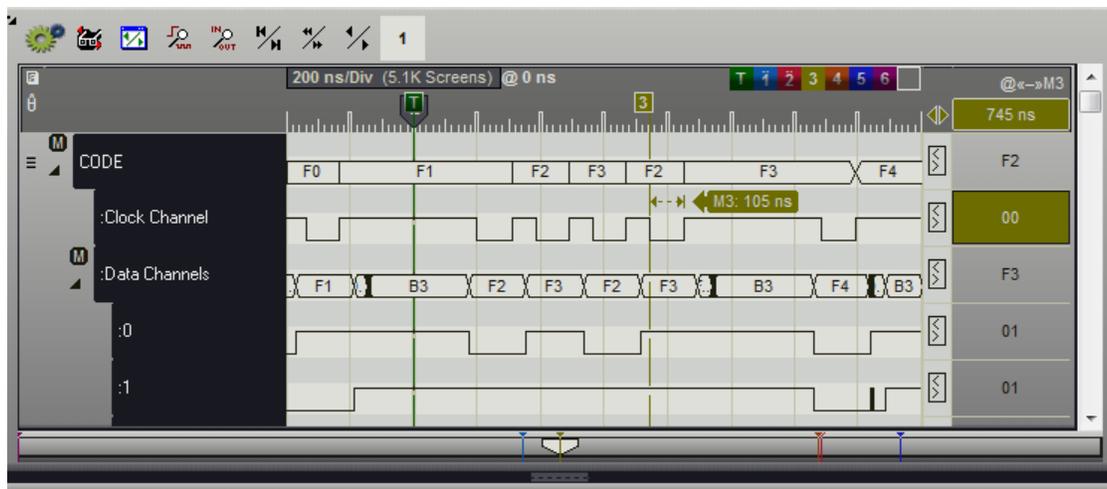
After releasing the mouse button, the marker snaps to the proposed edge and the time between the marker's current position and the center point of the screen is displayed at the top of the marker column. Below, we see this measurement to be 850ns with the text "@<->M3" directly above it..



If you DO NOT want to SNAP, but rather wish to drop the marker exactly at the mouse position, you can either hold down the control key or move your mouse above or below all waveforms before releasing the mouse button.

### Snap and Measure

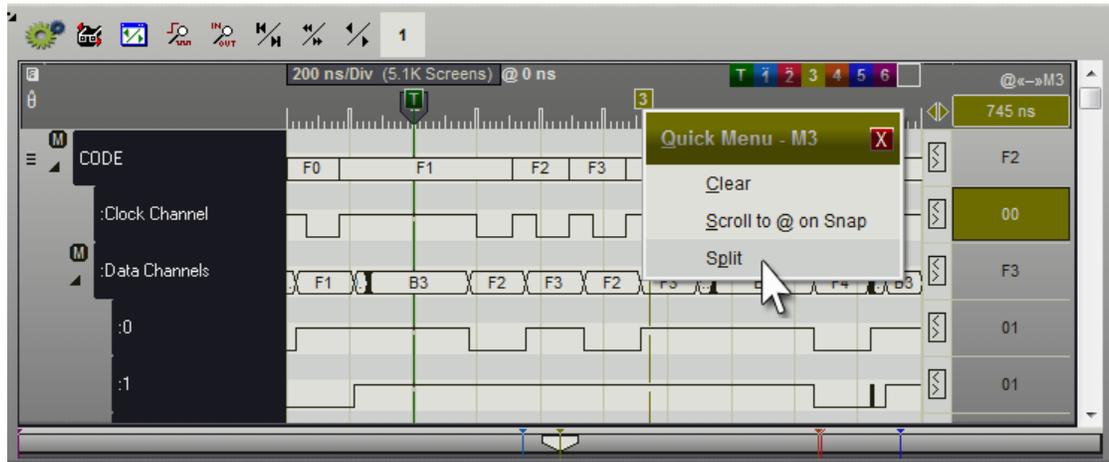
'Snapping' markers to signal edges makes it easy to measure time between them or to bring a specific edge to the center of the window (when "Scroll to @ on Snap" is enabled). When a marker is assigned to a signal, the marker column uses the same color as the marker. To snap to the previous or next edge, use the left or right mouse button respectively. In the graphic below we Left-Clicked in the marker column, causing the marker to snap to the previous edge of the signal and measure the time from its last position (also see: [Snap and Value columns](#)<sup>[135]</sup>).



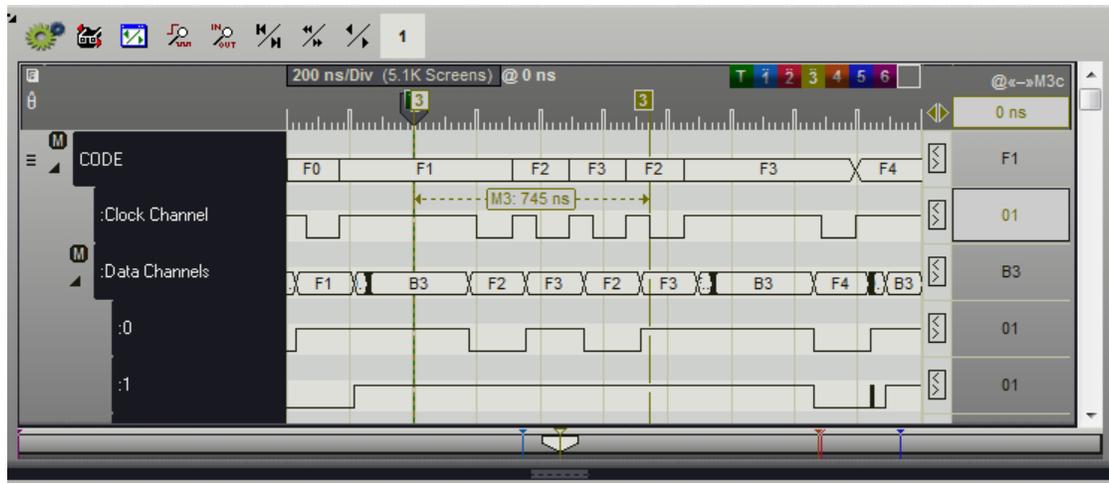
To assign the marker to another signal, Left-Click in the marker column of another signal. The first click assigns the marker. Any additional clicks will perform snap operations. If you drag a marker over a signal it automatically becomes the assigned signal.

### Split Marker

All main markers (M1 - M6) can be split form a tethered marker pair (a Main Marker and its Complement). To split a marker, Right-Click on the marker's flag and select "Split".

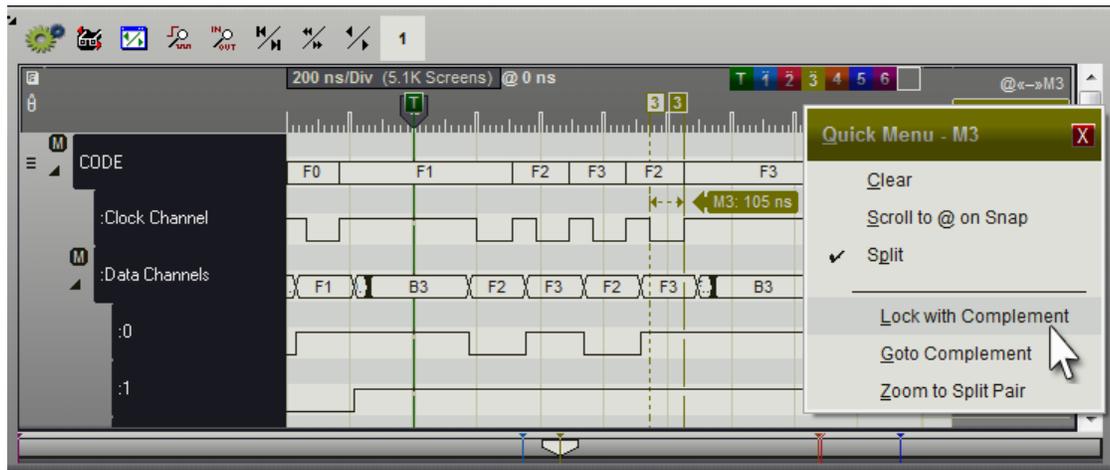


When splitting a marker, its complement is placed at the Center Time bookmark and the Complement marker is activated as the "Active Marker", meaning all indicators that reference the active marker will now display in reverse colors since complements use the inverted color of their main marker. If we select the main marker all indicates will return to the main marker's colors. The time measurement now reflects the time between the pair.



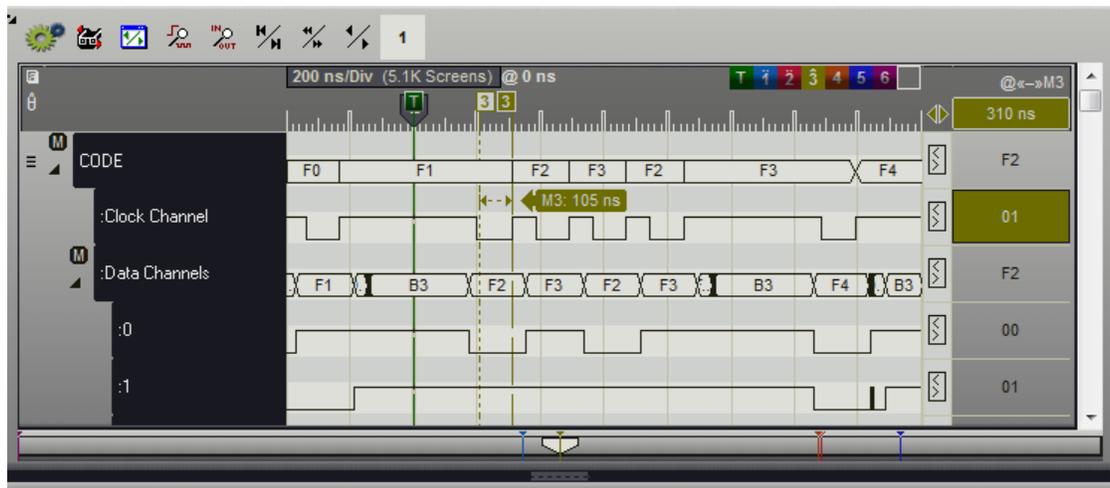
If you look closely at the Quick Select flag for M3 you will see two small dots above it. This indicates the marker is split and each half can move independently.

To lock the pair, move the markers to the desired position, Right-Click on the marker's flag and select the "Lock" item. The selection text will be "Lock with Complement" if you clicked on the main marker's flag but will be "Lock with Main Marker" if you clicked on the Complement's flag.



After selecting lock, the marker pair will always move together no matter which of the pair is the active marker. This includes dragging, snapping and placement by other means such as a search result (see [Searches](#)<sup>172</sup>). The two dots above the Quick Select flag will be connected to indicate the split pair is locked.

The graphic below shows how the distance between the two markers remains the same even after we snap the main marker several edges to the left. You can use this technique to readily compare a time span of multiple points in the captured data without having to mark or remember the precise period of each.

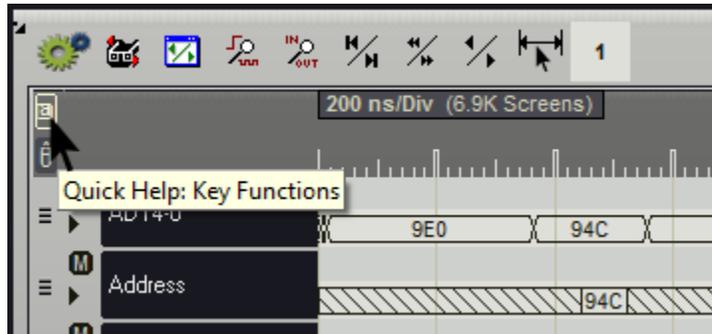


### 5.1.7 Key Functions

The HOT-KEYs are not expected to replace a mouse, but rather, supplement it. When analyzing lots of data, it can be useful to use the keyboard for say, ZOOMING and SCROLLING while using the mouse to drag a marker or as a snap modifier before dropping a marker.

## Hot Keys, Number Keys and Navigation Keys

Click on the Key Help button to display a summary of the key functions available in the waveform views.



### Hot Keys

- A: Auto Run
- R: Run Once
- P: Preview
- S: Stop (Retrieve Data)
- H: Halt (Do Not Retrieve Data)
  
- I: Zoom In
- O: Zoom Out
- T: Goto Trigger
- Z: Zoom to active marker pair (when already split) or zooms to active marker and its last position
- Shift-Key + Z: Toggles selection of Compliment and Zooms to the pair (splits if not already split)
- Space Bar: Toggles the selected Plot when the mouse is over a signal that has more than 1 plot enabled

### Number Keys (1 - 6)

- Number Key: Select and Goto Marker (places at screen Center (@) if not already visible) if split, will go to the main marker or its compliment (whichever one was last active)
- Shift-Key + Number Key: Place marker at screen Center (@), if split the main marker or its compliment will be placed at the center (whichever one was last active)
- CTRL-Key + Number Key: If Marker already Split, Toggles selection of Compliment and Brings marker to Center (@), (splits if not already split)
- Alt-Key + Number Key: Zooms to marker pair if split, else zooms to marker and its last position (same function as "Z" except the marker is specified by the number key)

#### Navigation Keys

- Up/Down Cursor: Scroll Vertically
- Left/Right Cursor: Scroll 1 Division Horizontally
- Shift-Key + Left/Right Cursor: Scroll 5 Divisions Horizontally
- [: Goto Beginning of Capture
- ]: Goto End of Capture
- < or >: Scroll 1 Division Horizontally
- Shift-Key + < or >: Scroll 5 Divisions Horizontally
- Home: Go Backward through Previous Zoom levels and Positions
- End: Go Forward through Next Zoom levels and Positions (after going backward)

## 5.2 Measurements

A wide range of measurement features are available from automatic instant measurements to user selected dynamic measurements. Dynamic measurements update based on which waveform the mouse moves over and changes its time span when a Quick measurement is being performed.

Each section below covers a unique method of calculating and displaying measurements to assist your analysis of the captured data. The Marker Delta window has the added benefit of Zooming and Scrolling a measured pair of markers into view when Double-Clicked.

### Measurement Features

- [Instant Measurements](#)<sup>[150]</sup>
- [Quick Measurements](#)<sup>[153]</sup>
- [Dynamic Measurement Window](#)<sup>[157]</sup>
- [Marker Delta Measurement Window](#)<sup>[161]</sup>

### 5.2.1 Instant Measurements

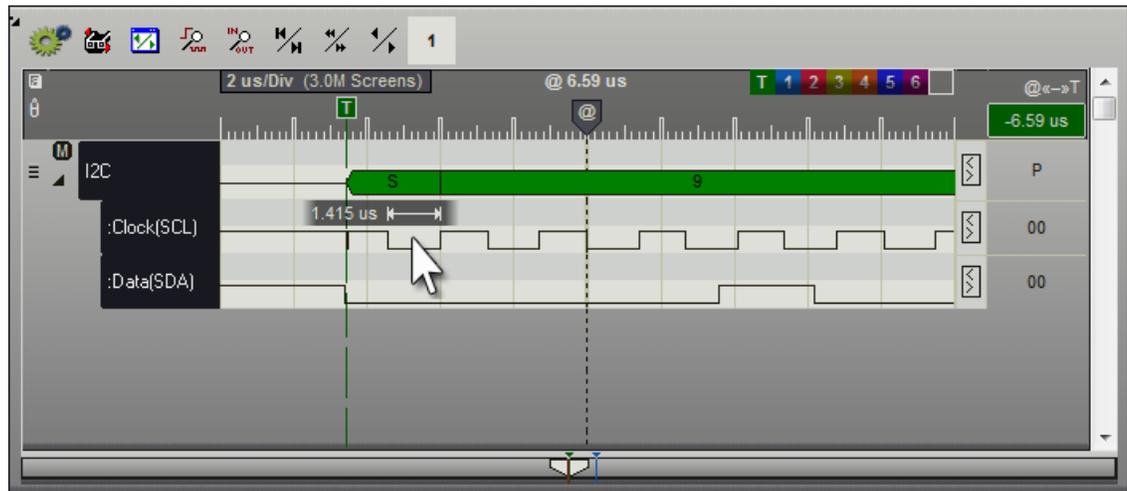
While moving the mouse over any waveform a measurement is displayed directly above it (see [Environment Settings: Waveform Views](#)<sup>[114]</sup>). The type of measurement is dependent upon the signal type and the mouse position in the waveform. Vertical lines and arrows are displayed to indicate which edges are being measured. The measurements are calculated even if the beginning and ending points of the measured item are off-screen.



Use this toolbar button to toggle Instant Measurements On/Off in a waveform view.

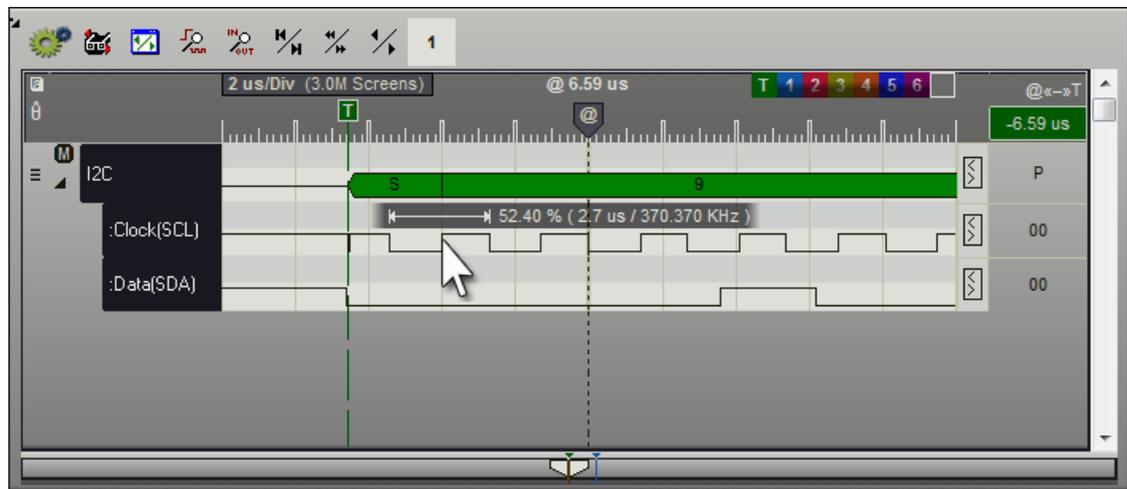
### Boolean Example

Mouse is between two edges so instant measurements calculates the time period between those edges. In the graphic below, the Period between the edges is 1.415 microseconds.



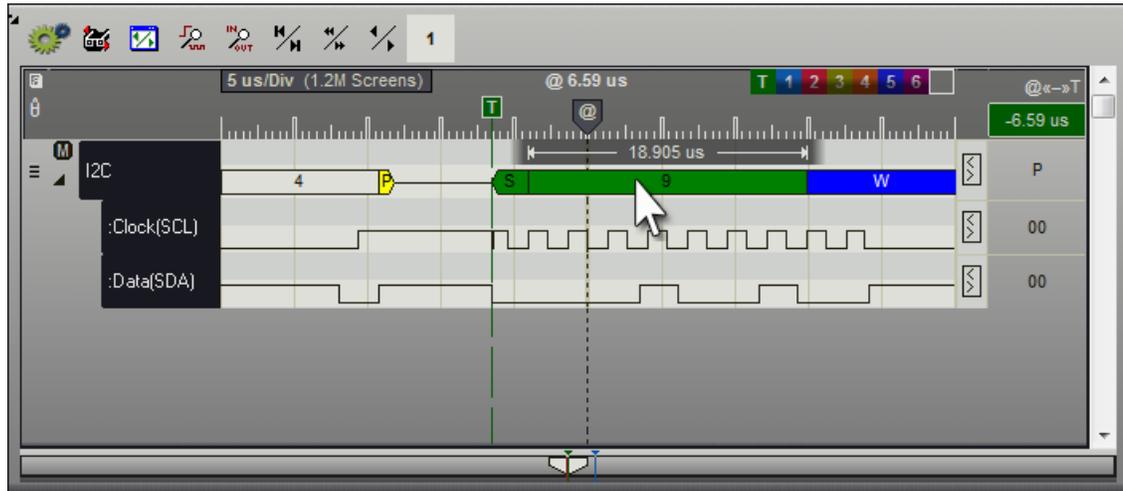
When the Mouse is on an edge, instant measurements uses the previous and next edge to calculate the duty between the edge under the mouse and the previous one. If this is a low period then Low Duty is represented, otherwise High Duty will be represented. In the graphic below, the Low Duty is 52.4%.

It also calculates the Period and Frequency from the previous edge to the next one as depicted by the arrows. In the graphic below, the Period is 2.7 microseconds and the Frequency is 370.370 KHz.

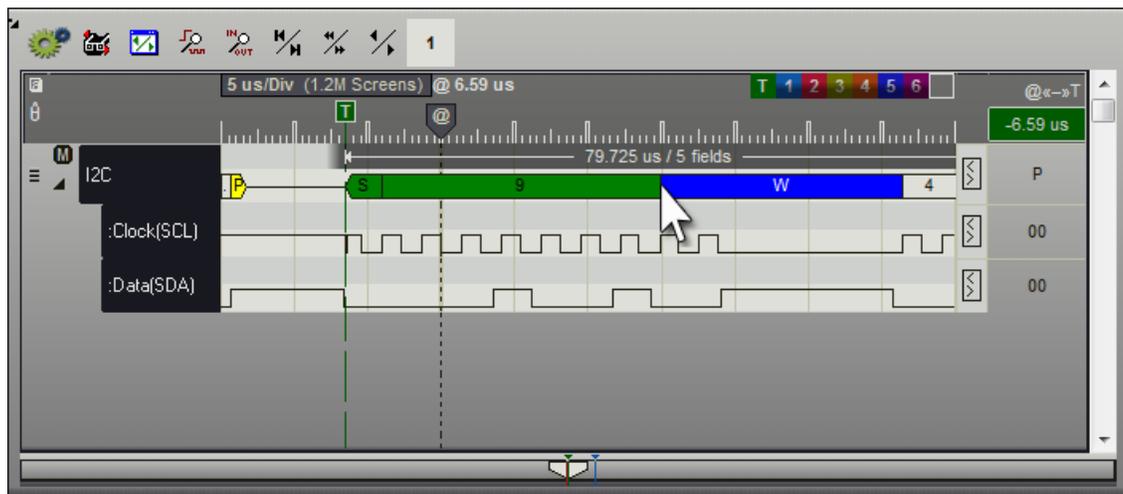


### Example for Signals with Field and Frame data

When the mouse is within the edges of a Field, the time period of the Field is calculated. In the graphic below, the Period for the Field under the mouse is 18.905 microseconds.



When the Mouse is on the edge of a field, instant measurements calculates the Period and Field Count of the Frame the Field belongs to. In the graphic below, the Period for the entire Frame is 79.725 microseconds and the Frame contains 5 Fields. The period and count are calculated even though the frame begins or ends off-screen.



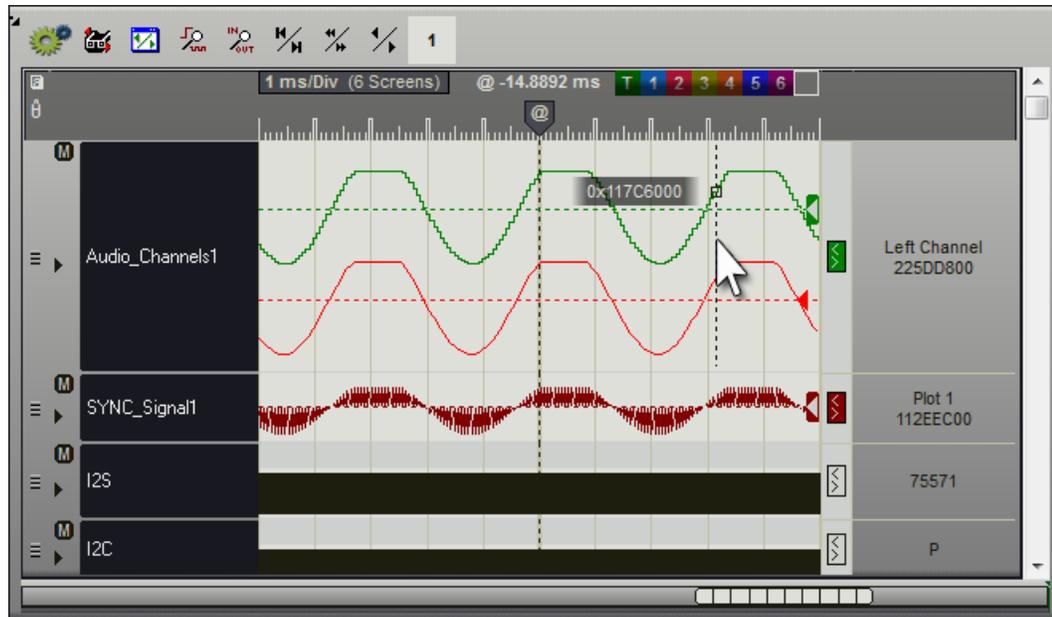
### Example for Signals with Plot Enabled

When a signal is in plotting mode, Instant Measurements will function on the Plot data and display the value of the plot at the mouse point. If multiple plots are enabled for the signal, Instant Measurements will function on the selected plot. Pressing the Space Bar will toggle the plot selection without having to move the mouse.

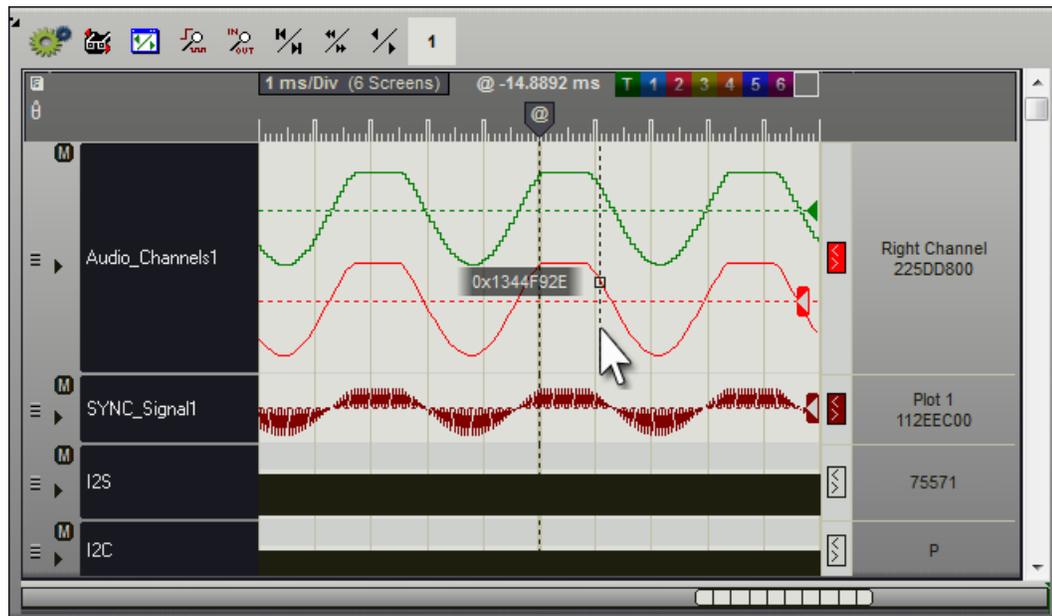
In the first graphic below, the top plot is being measured. This is identified by its plot handle being highlighted by a box in the plot's color. The Signal Snap arrows in the next column are also the same color as the plot and the marker column displays the selected plot's identifier. These items will change to identify the active plot.

In this case we used "Left\_Channel" and "Right\_Channel" to identify the two enabled plots for the Audio\_Channels1 signal. After pressing the space bar once, the second plot becomes active and instant measurements will track its values as displayed in the second graphic

("Right\_Channel" plot is active).



After pressing the space bar, the other plot value is displayed while moving the mouse.



A dotted Vertical line is always drawn at the mouse point and a small square surrounds the point where this intersects with plotted data. The value at this intersection is displayed in the Instant Measurement.

## 5.2.2 Quick Measurements

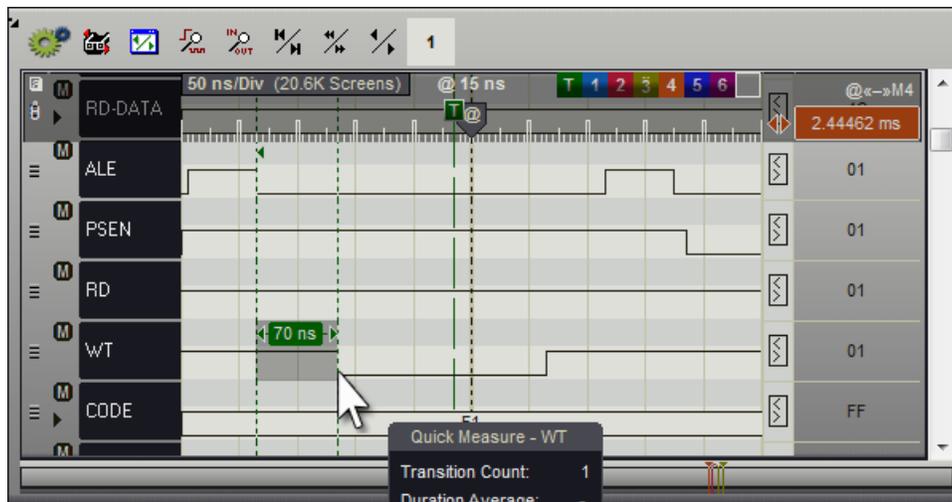
With Quick Measurements you can instantly perform multiple measurements in a waveform by using the Middle Mouse Button. Click the middle button and move the mouse to display measurements from any position (including over markers) to another position. These measurements are unique to the signal type and whether the Signal Definition has plotting enabled. You can also measure the period between two edges across multiple signals.

A simple period measurement is always displayed above the waveform between the two points while performing the Quick Measurement. However, additional measurements will appear in a floating window that hovers near the mouse. To dismiss the Quick Measurement, simply click again using any mouse button or use the ESC Key.

Note: While performing a Quick Measurement, the period measured is automatically used as the time span in [Dynamic Measurement](#) windows.

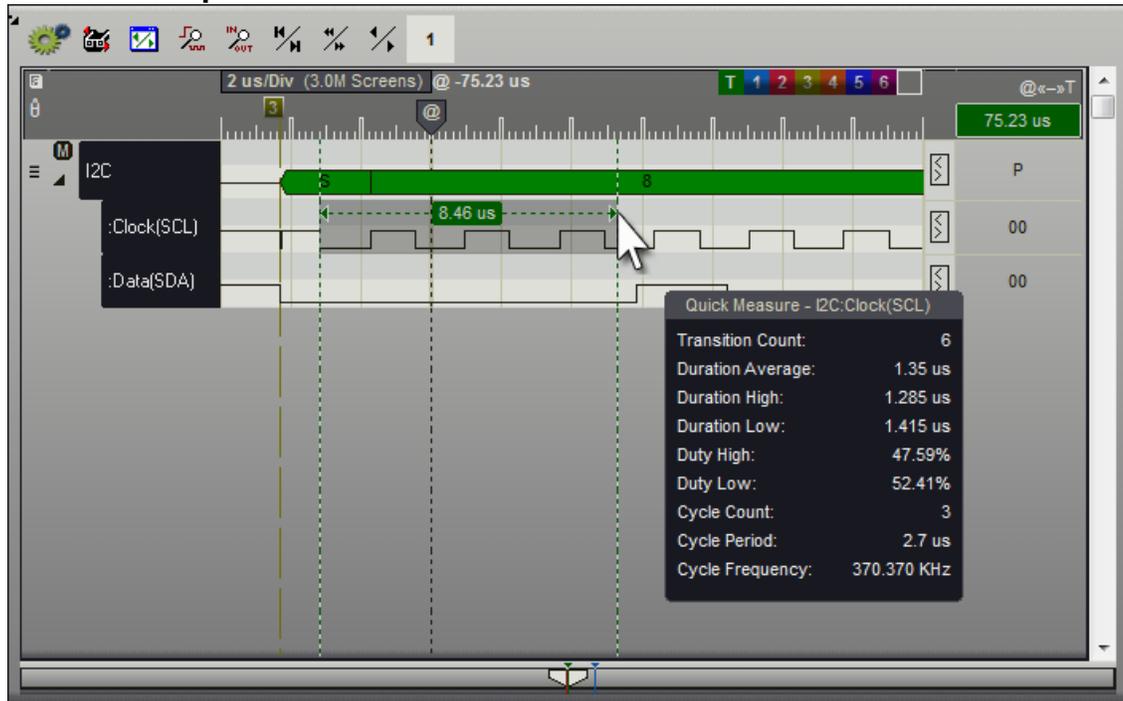
### Measure across multiple signals

Quick Measurements will snap to a transition edge (when near) and remember the Signal of the starting and ending measurement point. The measurement is always displayed for the signal currently under the mouse. However, if the starting signal is different than the ending signal, an additional arrow is displayed in the starting signal at the starting point.

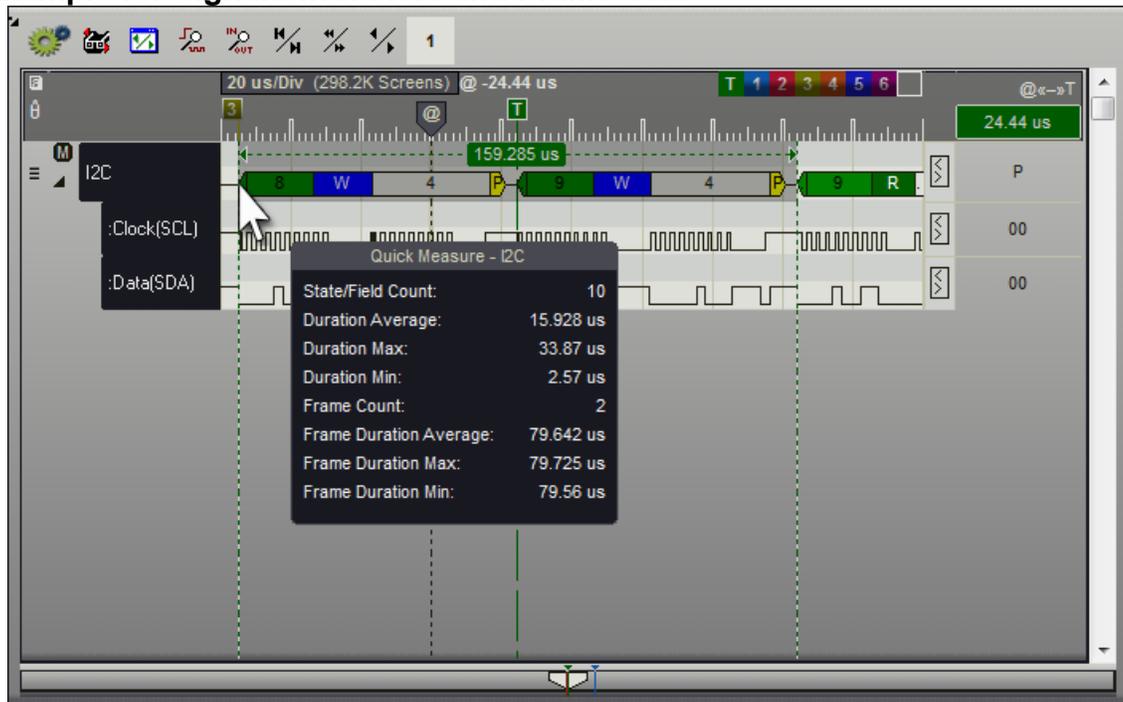


In the graphic above, we are measuring the time between the falling edge of ALE and the falling edge of WT. We started the Quick Measurement on ALE so an additional arrow is displayed on the edge we started with. Any measurements displayed in the floating window will be measured from the signal currently under the mouse (WT in the graphic above).

### Boolean Example

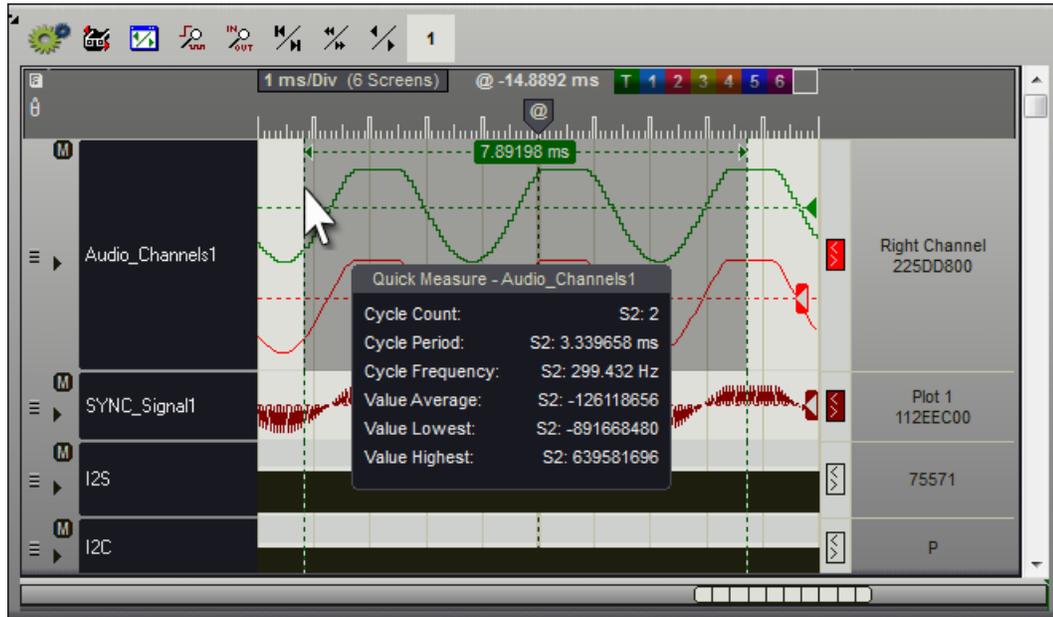


### Example for Signals with Field and Frame data



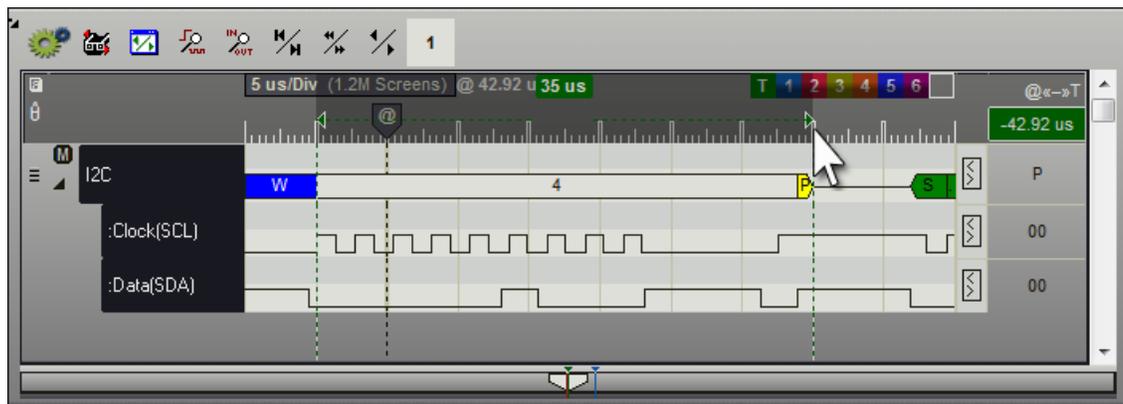
### Example for Signals with Plot Enabled

When a signal is in plotting mode, Quick Measurements will calculate using the Plot data between the two mouse points. If multiple plots are enabled for the signal, Quick Measurements will function on the selected plot. Pressing the Space Bar will toggle the plot selection and refresh the measurements without having to move the mouse.



### Additional Features

When capturing new data, Quick Measurements will try to maintain the measurement even if the edges are on 2 different signals. If a transition is detected at the time of the original edge or within 1/10th of a division in either direction, the Quick Measurement will snap to it and display the new values. Changing the zoom level of the waveform view will change the tolerance of the auto snapping feature (i.e. 1ns tolerance @10 ns/Div, 50ns tolerance @500 ns/Div).



Quick Measurements will snap to the Division Grid tick marks while active in that area and will only display the time between the two points (shown with green arrows at the measured points and the result centered near the top).

Using the CTRL Key will override Signal Edge Snapping and Division Grid Snapping and

measuring will begin and/or end at the mouse point instead of a snap point.

(also see [Environment Settings: Waveform Views](#)<sup>[114]</sup>)

### 5.2.3 Dynamic Measurement Window



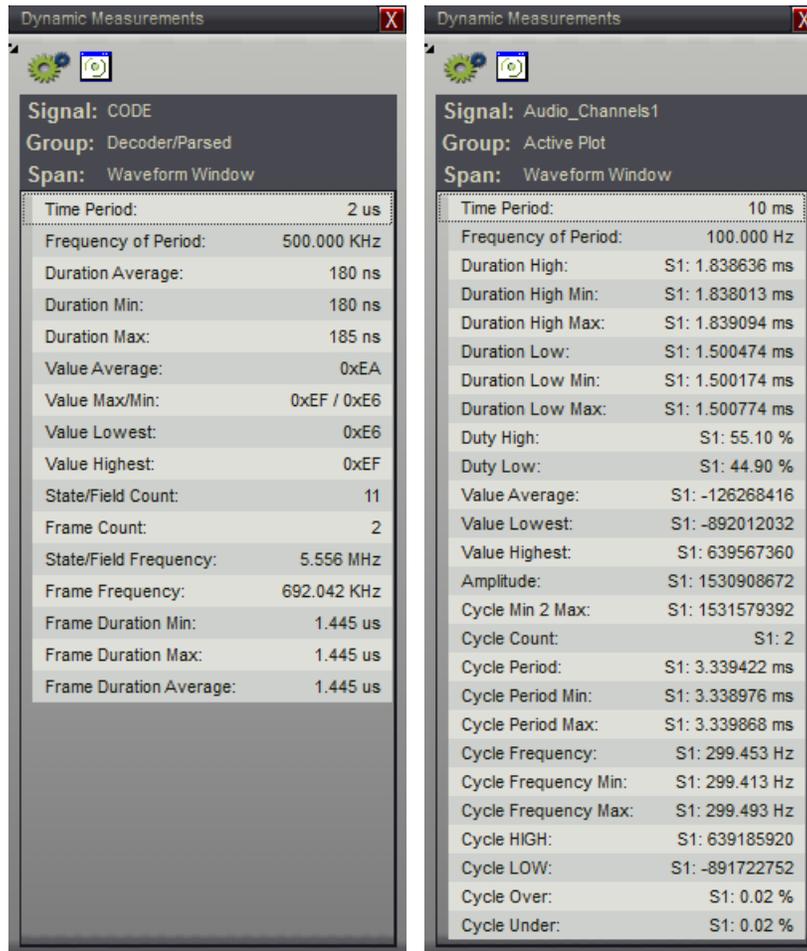
To open a new Dynamic Measurement Window, use the "Open Feature Window" button and select "Measurements" from the menu. Dynamic Measurement windows can be docked, tabbed with other dockable windows or placed on any monitor (see [Window Arrangement](#)<sup>[9]</sup>).

Dynamic Measurement Windows offer a variety of measurements that can be selected for each type of Signal group. As the mouse moves over the waveform of a signal, the selected measurements for that signal type will recalculate and display in the window.

Dynamic Measurements	
Signal:	ALE
Group:	Boolean
Span:	Waveform Window
Time Period:	2 us
Frequency of Period:	500.000 KHz
Transition Frequency:	11.230 MHz
Transition Count:	22
Duration Average:	89.048 ns
Duration Min:	60 ns
Duration Max:	120 ns
Duration High:	61.818 ns
Duration High Min:	60 ns
Duration High Max:	65 ns
Duration Low:	119 ns
Duration Low Min:	115 ns
Duration Low Max:	120 ns
Duty High:	36.36%
Duty Low:	63.64%
Duty High/Low:	36.36% / 63.64%
Cycle Count:	10.5
Cycle Period:	180.818 ns
Cycle Period Min:	180 ns
Cycle Period Max:	185 ns
Cycle Frequency:	5.530 MHz
Cycle Frequency Min:	5.405 MHz
Cycle Frequency Max:	5.556 MHz

Dynamic Measurements	
Signal:	AD0-15
Group:	Bus
Span:	Waveform Window
Time Period:	1 us
Frequency of Period:	1.000 MHz
Transition Frequency:	11.034 MHz
Transition Count:	9
Duration Average:	90.625 ns
Duration Min:	5 ns
Duration Max:	290 ns
Value Average:	0x5DD7
Value Max/Min:	0x95B3 / 0x5B3
Value Lowest:	0x5B3
Value Highest:	0x95B3



**Signal:**

The name of the signal being measured.

**Group:**

The measurement group compatible with the signal. The selected measurements of this group will be calculated and displayed in the window. If the signal has plotting enabled, the Plot group of measurements are displayed for the currently active plot. The Plot Series number (S1, S2, S3, S4) will be prepended to the value as a reminder of which Plot Series is active for the signal.

**Span:**

This indicates which Time Span is being used for calculations; Waveform Window or Quick Measurement. By default, the time span of the waveform window that is responding to mouse movements is used. However, while performing a [Quick Measurement](#)<sup>[153]</sup>, this will automatically change to use the Quick Measurement's time span (and recalculate the measurements accordingly). When the Quick Measurement is no longer active (middle mouse button is released) the time span reverts back to the Waveform Window's time span.

**Selecting Measurements**

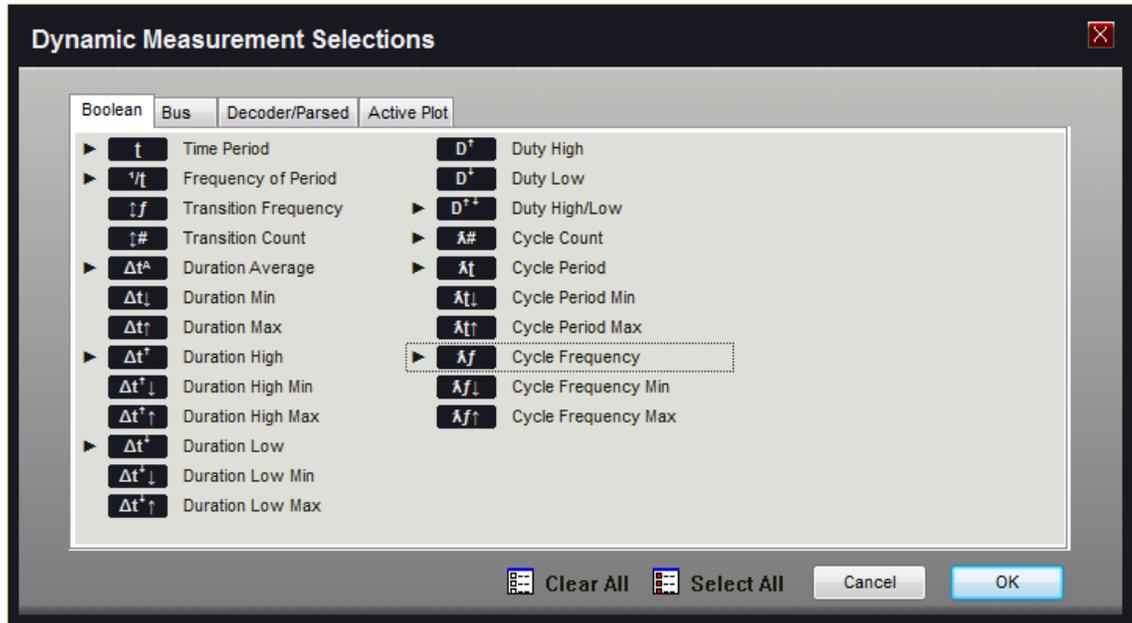
Compatible measurements for each signal type are divided into individual selectable groups. You can choose whatever measurements you want to display for that type. Selection is optional, so do not select any if you do not need a measurement for a particular signal type. The Dynamic

Measurement window will only display the measurements you select and those will only display when the mouse is over a compatible signal type.

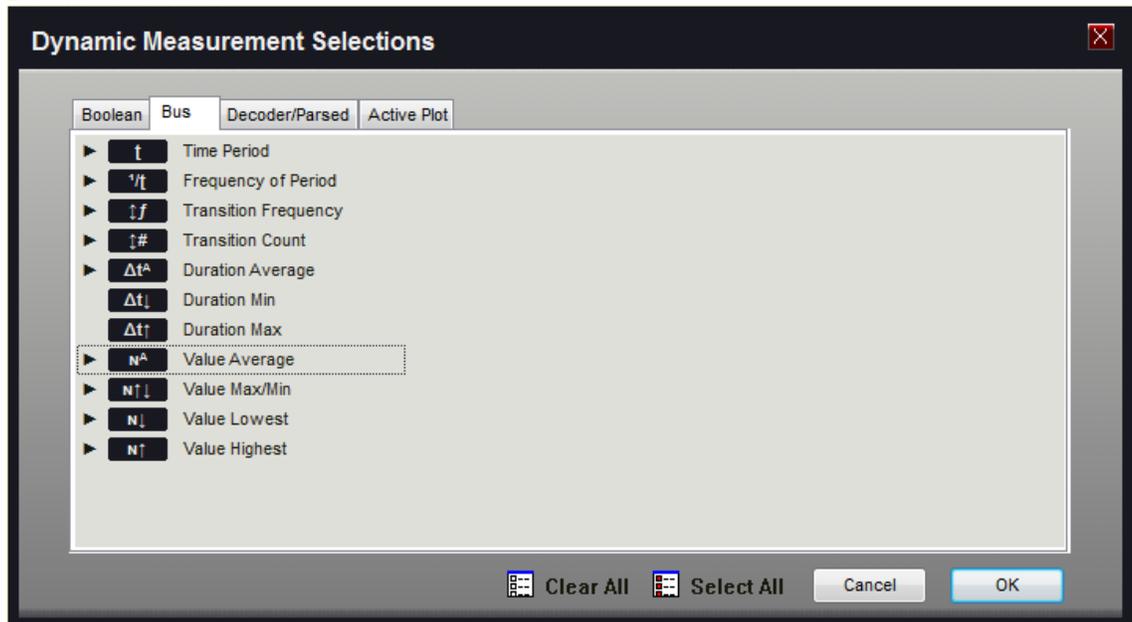


Left-Click in the window or Click on the "Select Measurements" button in the toolbar to open the Dynamic Measurement Selections window.

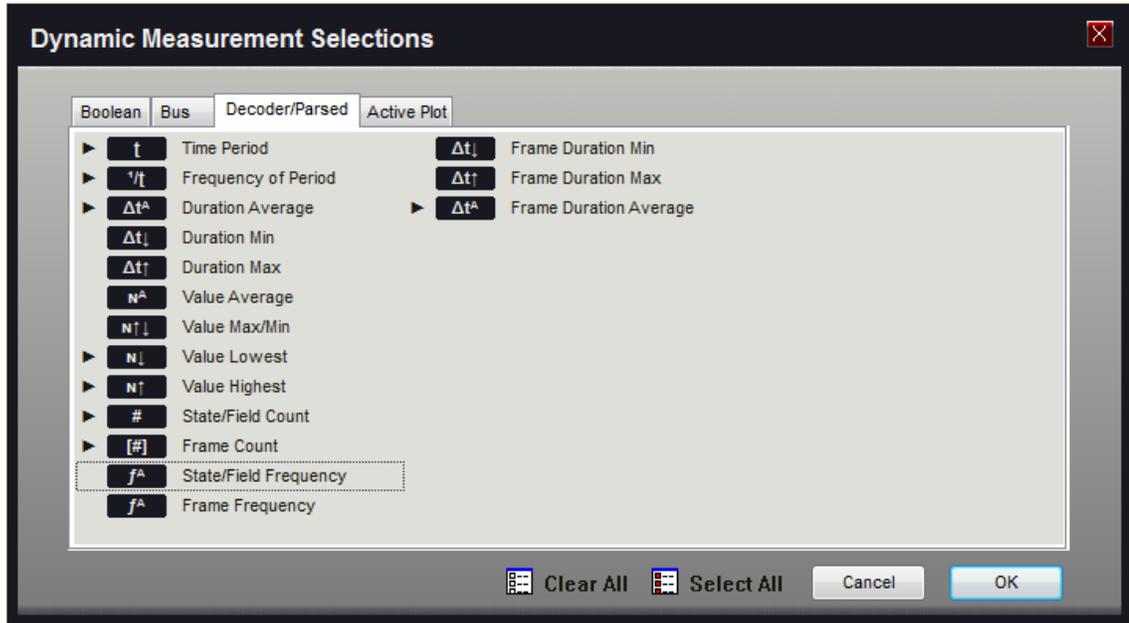
### Boolean Measurements



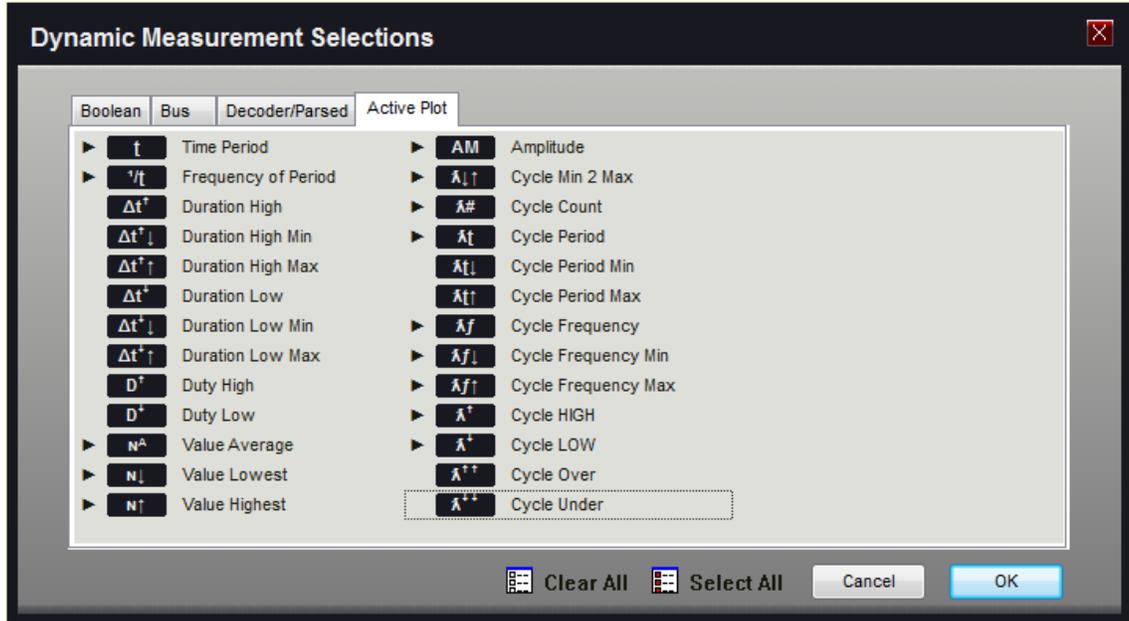
### Bus Measurements



Decoder/Parsed Measurements



Active Plot Measurements



Select or Clear All

The Select All and Clear All buttons will select or clear all items for the current measurement group. For example, if you are editing the selections for the Boolean group, pressing "Clear All" will not clear selections in the other groups.

### Toggle Selection

A "selected" pointer will be displayed on the left of any selected item. Click on any item to toggle its selection state. If the item is already selected, a click will clear it.

## 5.2.4 Marker Time/Delta

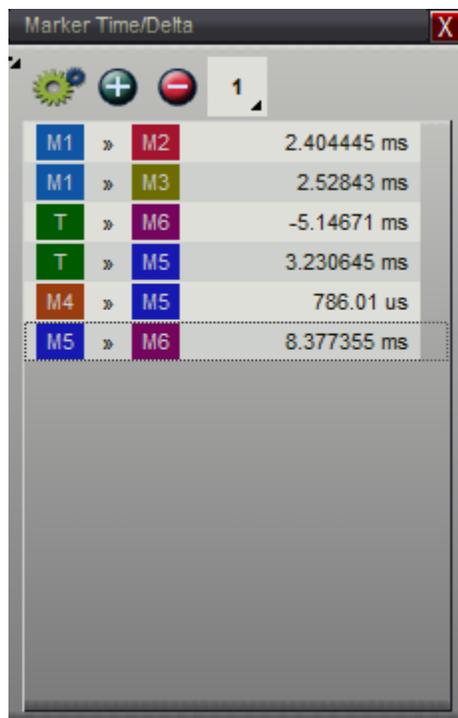


To open a new Marker Time/Delta Window, use the "Open Feature Window" button and select "Marker Time/Delta" from the menu. Marker Time/Delta windows can be docked, tabbed with other dockable windows or placed on any monitor (see [Window Arrangement](#) <sup>(9)</sup>).

Select from pairs of markers or from markers and the Trigger point to track the time delta between the selected items. Double-Click on a selected pair to scroll and zoom both into view.

Selection is not limited to adjacent pairs. Any combination of markers and/or the Trigger Point can be selected.

The time between a pair of selected items is displayed to their right.



### Tool Bar Buttons



Select the Menu button to access Window options.



**Menu Add New Time Item**



Select the Add New Time Item button or the "Add Marker Time/Delta" menu item to open the Choose Marker Pair selector.



Click on one item in each column to add a marker pair to the Marker Time/Delta window. As soon as the second item is clicked, the pair is added. When selecting, all duplicates are prevented and will not be added to the window. For example, adding M4 to M5 is the same as adding M5 to M4 so only the first set will be seen in the window. Invalid selections such as a duplicate pair or selecting the same marker in each column are cleared. When you have finished selecting pairs, press the Escape Key or click the red close button in the upper right corner of the selector (X).

**Delete the selected Item**



To Delete an item from the list, first select it by using a single Left-Click. After an item is selected, use the Delete button or the "Delete Selected" menu item to remove it. Selected items are surrounded by a dotted rectangle similar to the last item in the top graphic. To Delete all items, use the "Delete All" menu item.

**Link Group indicator and selector**



The last item on the tool bar is the Link Group assignment. Any actions performed in the window that affects the time or position of other windows will be performed only on those windows that belong to the same group. Click on the indicator to change the group assignment.

### Zoom and Scroll

Double-Click on an item in the list or use the "Jump to Marker Pair" menu item to Zoom and Scroll the pair of markers into view. The focused Waveform Window in the same Link Group will update to a zoom level where both markers are in view and centered on the "@" symbol. Any other windows in the same group will synchronize their center time to match.

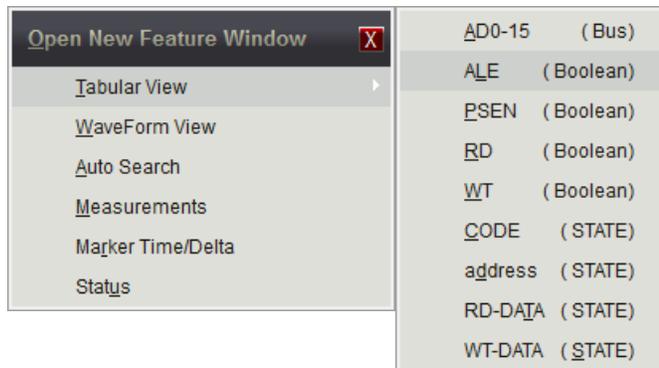
## 5.3 Table View Windows

Table views present the data as a list of numbers (tabular form). Table windows can be created by using the Feature Window button on the [Top Toolbar](#)<sup>[74]</sup>, by using the local menu of a Boolean or Bus signal in [Waveform Views](#)<sup>[127]</sup> or by using the Main Menu (**Menu-> Window-> New-> Tabular View**). Table creation selections in the Main Menu and Feature Window lists are only available after creating a [Signal Definition](#)<sup>[31]</sup>.

Any signal type can be displayed in Tables. However, decoded signals will be displayed in their raw channel values. To see the decoded values of these signals in a tabular view see [List View Windows](#)<sup>[166]</sup>.



To create a new Table Window, select the "Open Feature Window" button from the main toolbar, then select the name of a defined Boolean or Bus signal from the Tabular View menu item. If you select any other type of signal, a [List View](#)<sup>[166]</sup> will be created instead. Only the Signal Definitions you create for the project will be listed on the Tabular View.



	ALE	AD14-0
17.62 us	0	76AB
17.73 us	0	7687
17.98 us	1	7687
18.08 us	1	76B4
18.17 us	0	76B4
18.27 us	0	761F
18.52 us	1	761F
18.63 us	1	76B3
18.71 us	0	76B3
18.82 us	0	769F
19.06 us	1	769F
19.17 us	1	76AA
19.18 us	1	7FAA
19.25 us	0	7FAA
19.46 us	0	7FEF
19.47 us	0	7FFF
19.54 us	0	7FD2
20.15 us	1	7FD2
20.25 us	1	76D2
20.26 us	1	76B3
20.34 us	0	76B3
20.44 us	0	769B
20.45 us	0	769F
20.69 us	1	769F
20.8 us	1	76B2

- Multiple tables can be created and viewed simultaneously.
- Multiple signals can be viewed with each signal in a separate column.
- Multi-Channel Signals can be "expanded" to multiple columns.
- Expand order of Multi-channel signals can be reversed.
- Signal column order can be re-arranged by dragging.
- Bus Signals can be formatted as Binary, HEX or Decimal.
- Time Display can be set to Auto, ns, us, ms, sec, min, hrs, days or weeks.
- Time Format can be set to Delta or Absolute.
- Time Column can be hidden.
- Set, Clear or Jump to markers. (see [Using Markers](#)<sup>[139]</sup>)
- Assign Time Synchronized Link Group. (see: [Using Link Groups](#)<sup>[171]</sup>)
- Select which Signals to view in each Table.
- Edit Signal Properties. (see: [Signal Editors](#)<sup>[33]</sup>)
- Print current Table View or Save as JPEG. (see: [Printing](#)<sup>[194]</sup>)
- Export data using Table's settings. (see: [Exporting Tables](#)<sup>[191]</sup>)

While most manufacturers provide table views, they generally are not too useful for anything other than STATE mode signals. Most logic analyzer demos will show data changing on every sample, making the table view look interesting in timing mode. However, in real usage, most signals do not change at anywhere near the sample rate, causing the table to show a small sample of stable data. You might have to scroll several screens before seeing the signal transition. We have added several enhancements to the basic table view to make them truly beneficial in real-world usage.

## Compressed View

This mode compresses out the 'dead-time' between transitions, packing a lot more information into a screen of table data. Each line of data in the table contains the timestamp and the data. The time between lines varies and corresponds to the length of time the previous sample was stable. In this mode, a 40 line table contains 40 transitions. In linear (non-compressed) mode, it would contain 40 SAMPLES with perhaps NO transitions. If multiple signals are added to the table, the compression algorithm takes ALL signals in to account. A new line is shown any time ANY of the signals change state. Nothing is lost or thrown away. We simply compress out the redundant information, making the table hold more significant data. You can switch between compressed and linear views with a single click at any time.

Although compressed mode is the most efficient way to display a signal in tabular form, some people have trouble visualizing the non-linear, compressed time. You can Link a compressed table with other non-compressed tables or with waveform displays to correlate the data to a linear view. This allows BOTH an efficient table view and a linear 'in-context' view.

The included '8051.dat' example demonstrates this well. The OE signal in that example is spread across about 1.4 Million samples but can be displayed in less than 20 table lines when compression is enabled. When this table is linked to a waveform view, scrolling through this small table quickly scrolls the waveform to each significant event in the OE signal. This is a real-world example captured from a real embedded system.

### **Delta vs. Linear time**

Regardless of the display mode( normal, compressed or down-sampled), you can display the time field in absolute or delta time. Absolute is the actual timestamp of the sample (relative to trigger). DELTA mode shows the time between table lines. This is most useful in compressed mode where it tells you the time between transitions. In normal and down-sampled modes, it simply tells you the sample rate( since the time between each line is constant).

### **Table Menu**

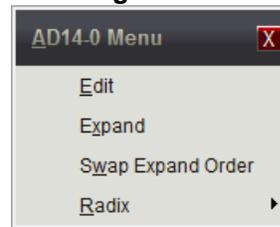


The table's menu offers several useful functions such as navigating to a reference point, adding additional signals, configuring the time and so forth. To activate the menu for a specific signal from within the table, right-click in the signals' column. Examples of these menus are displayed below.

**Table General Menu:**



**Table Signal Menu:**



## 5.4 List View Windows

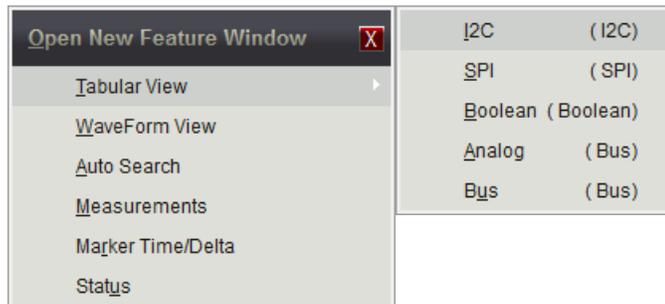
List views present the decoded data of higher level signal types in column form. List windows can be created after defining a signal that supports decoding (such as I2C).

List windows can be created by using the Feature Window button on the [Top Toolbar](#)<sup>[7]</sup>, by using the local menu of a signal in [Waveform Views](#)<sup>[127]</sup> or by using the Main Menu (**Menu-> Window-> New-> Tabular View**). List creation selections in the Main Menu and Feature Window lists are only available after creating a [Signal Definition](#)<sup>[31]</sup>.

All signals that use decoding or any Plug-in signal can be displayed in the List window. The only signals that can not display in the List window are Bool and Bus. These signals can be presented in tabular format using a Table view. (see: [Table Views](#)<sup>[163]</sup>)



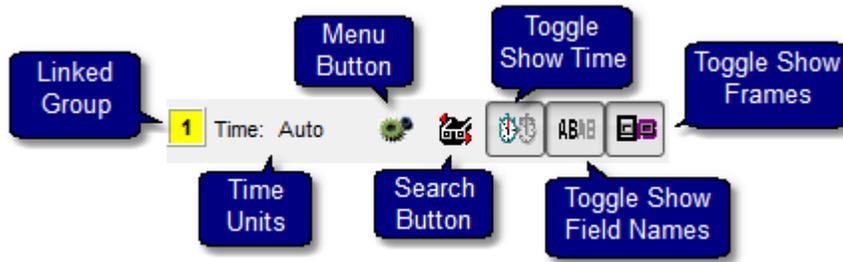
To create a new Decoded List Window, select the "Open Feature Window" button from the main toolbar, then select the signal name from the Tabular View menu item. If you select a Boolean or Bus signal, a [Table View](#)<sup>[163]</sup> will be created instead. Only the Signal Definitions you create for the project will be listed on the Tabular View.



Decoded List: I2C

Time	S	R	W	P	BA	CC	0	0	0	0	0	0	19	E9	4	F4	83	0	0	0	0	1	N	P
28.911582655 Sec.	S	9	W	4	P																			
28.911662405 Sec.	S	9	R	21	BA	CC	0	0	0	0	0	0	19	E9	4	F4	83	0	0	0	0	1	N	P
29.02149421 Sec.	S	8	W	4	P																			
29.021575145 Sec.	S	9	W	4	P																			
29.021656205 Sec.	S	9	R	21	BA	CC	0	0	0	0	0	0	B6	95	3	F4	A3	0	0	0	0	1	N	P
29.13150843 Sec.	S	8	W	4	P																			
29.131589365 Sec.	S	9	W	4	P																			
29.1316691 Sec.	S	9	R	21	BA	CC	0	0	0	0	0	0	35	50	3	F4	A3	0	0	0	0	1	N	P
29.24150808 Sec.	S	8	W	4	P																			
29.24158766 Sec.	S	9	W	4	P																			
29.241668745 Sec.	S	9	R	21	BA	CC	0	0	0	0	0	0	7E	0	3	F4	83	0	0	0	0	1	N	P
29.35152097 Sec.	S	8	W	4	P																			
29.351601895 Sec.	S	9	W	4	P																			
29.35168164 Sec.	S	9	R	21	BA	CC	0	0	0	0	0	0	16	BA	2	F5	A3	0	0	0	0	1	N	P
29.4615251 Sec.	S	8	W	4	P																			
29.46160469 Sec.	S	9	W	4	P																			

- Multiple lists can be created and viewed simultaneously.
- Time Display can be set to Auto, ns, us, ms, sec, min, hrs, days or weeks.
- Time Format can be set to Delta or Absolute.
- Time Column can be hidden.
- Set, Clear or Jump to markers. (see [Markers](#)<sup>[139]</sup>)
- Assign Time Synchronized Link Group. (see: [Using Link Groups](#)<sup>[171]</sup>)
- Select which Signal to view in each List.
- Edit Signal Properties. (see: [Signal Editors](#)<sup>[33]</sup>)
- Print current List View or Save as JPEG. (see: [Printing](#)<sup>[194]</sup>)
- Export data using List's settings. (see: [Exporting Lists](#)<sup>[189]</sup>)
- The Radix can be set to Binary, Decimal, Hex, Octal or ASCII.
- Field widths can be set for "Auto Size" (width is content based) or manually sized with a zoom button (equal width for all fields).
- Selecting a field in a List will scroll all windows of the same Link Group to the field's start time and vise-versa (as shown above, the selected field is the darkened "35" in the center row).
- Navigate and scroll using the Cursor Keys and Mouse Wheel.



List Views have several options to change what data to display and how the data is displayed. These options are accessible from the top bar in the window and can be used in combination. Some examples of the display options are shown below using an I2C signal.

**Time Column:**

Decoded List: I2C

Time	Value
29.131610845 Sec.	W
29.13162734 Sec.	4
29.131661215 Sec.	P
29.1316691 Sec.	S
29.131671675 Sec.	9
29.13169058 Sec.	R
29.13170258 Sec.	21
29.131734345 Sec.	BA
29.13176608 Sec.	CC
29.13179774 Sec.	0
29.13182951 Sec.	0
29.131861245 Sec.	0
29.131892905 Sec.	0
29.13192467 Sec.	35
29.131956415 Sec.	50
29.131988245 Sec.	3

**Time Column, Name:**

Decoded List: I2C

Time	Name	Value
29.131610845 Sec.	WRITE	W
29.13162734 Sec.	Data	4
29.131661215 Sec.	STOP	P
29.1316691 Sec.	START	S
29.131671675 Sec.	Addr	9
29.13169058 Sec.	READ	R
29.13170258 Sec.	Data	21
29.131734345 Sec.	Data	BA
29.13176608 Sec.	Data	CC
29.13179774 Sec.	Data	0
29.13182951 Sec.	Data	0
29.131861245 Sec.	Data	0
29.131892905 Sec.	Data	0
29.13192467 Sec.	Data	35
29.131956415 Sec.	Data	50

**Time Column, Name, Frames:**

Decoded List: I2C

Time	Name	Addr	Value	Frames
29.021656205 Sec.	START	S	9	READ Data Nak STOP
29.13150843 Sec.	START	S	8	WRITE Data STOP
29.131589365 Sec.	START	S	9	WRITE Data STOP
29.1316691 Sec.	START	S	9	READ Data BA CC 0 0 0 0 0 0 35 50 3 F4 A3 0 0 0 1 N P
29.24150808 Sec.	START	S	8	WRITE Data STOP
29.24158766 Sec.	START	S	9	WRITE Data STOP
29.241668745 Sec.	START	S	9	READ Data Nak STOP
29.35152097 Sec.	START	S	8	WRITE Data STOP



## 5.5 Using Link Groups

Link groups provide **Synchronous Scrolling** of a group of windows that display data. When several windows are part of the same Link Group, each window will automatically update and scroll when any member of the group changes its center time. The time reference and displayed data of each member will "center" on the time the changing member centers on. This feature keeps a group of windows synchronized to the same time in the captured data.

DigiView provides five link options that include Link Groups 1 through 4 and a "no-link" option for windows that you want to keep independent.

### Default link groups:

**Link Group 1** - Waveform View 1 is always a member and all new windows initially belong to this group.

**Link Group 2** - Waveform View 2 is always a member of Link Group 2.

**Link Group 3** - Empty Group, ready for members.

**Link Group 4** - Empty Group, ready for members.

The link group of any window that displays data (such as Tables and Lists), can be changed at any time. To change the group in these windows Click on the Link Group Indicator on the window's toolbar or select Link from its menu (**Menu-> Window-> Link**). Link options are displayed in the following graphic.



All windows or views that are assigned to a link group will have a visible indicator with the group number or an " \* " (asterisk) displayed. The Primary and Secondary Waveform Views are permanently assigned to groups 1 and 2 respectively. All other windows can be assigned to any of the 4 link groups or set to be independent of link groups (\*). A small arrow is displayed in the lower right corner of the link group indicator if the group assignment can be modified.

### Link Group indicator:



NOTE: When Waveform View 1 is "cross-linked" to Waveform View 2, all members of Link Groups 1 and 2 will also be cross-linked. Waveform Views are cross-linked by using the Link button on the Top Tool Bar. (see [Top Tool Bar](#) <sup>7</sup>)

## 5.6 Searches

When analyzing the captured data, the ability to search forward and backward for specific pattern matches or packet values is indispensable. DigiView provides a general search type for pattern matches, a Sequential Frame and Sequential Field search for parsed signals and a Search Manager to quickly perform multiple searches and change criteria.

DigiView also provides a Capture History Search feature that utilizes any defined search to iterate through the entire history and load the capture that meets the match criteria.

The following sections provide details of DigiView's searching capabilities.

- [Defining Searches](#)<sup>[172]</sup>
- [DigiView's Search Types](#)<sup>[173]</sup>
- [Performing a Search](#)<sup>[178]</sup>
- [Using the Search Manager](#)<sup>[179]</sup>
- [Auto Search Windows](#)<sup>[180]</sup>
- [Searching Capture History](#)<sup>[182]</sup>

### 5.6.1 Define Searches

New searches are defined by opening the [Search Manager](#)<sup>[178]</sup> window and clicking on the "New" button or using the main menu (**Menu-> Search-> New Search**) then selecting the signal to search from the selection list. Depending on the type of signal selected, a Pattern Search or Sequential Search will be created and its editor window will automatically open. For example, if you have selected a signal of type "I2C", then the Sequential search type will be created. (For details on each search types, see: [Search Types](#)<sup>[173]</sup>).

After a search is created it will be available in the [Search Manager](#)<sup>[179]</sup> and all search selection windows, including selection for [Auto Search](#)<sup>[180]</sup> windows and searching the [Capture History](#)<sup>[120]</sup> files.

All search types (and therefore all search editors) have the following common properties.

The screenshot shows a search editor window with the following fields:

- Search Name:** A text input field containing "Find MAIN MENU".
- From:** A dropdown menu currently set to "Center Time".
- Set Marker:** A dropdown menu currently set to "2".

#### Search Name - Description

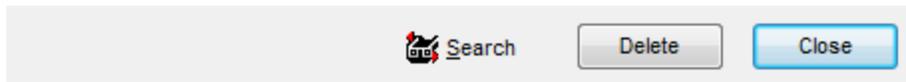
Use the Name field to describe the search. This descriptor will be displayed in the Search Manager Windows and in the Global Search selection box.

#### From - Where to begin Searching

The 'search from' selection determines where the search starts from; the current center of screen or the current marker location. Since the marker is placed at the center of the screen after the first search match, these are often the same during consecutive searches. The main difference occurs during the first search or between searches if you scroll the screen.

#### Set Marker - Mark the match point

The marker selection determines which marker is used to show the search match. You must select one. Whenever the search matches, the selected marker is placed at the match point and then centered in the searched window.



**Delete Button** - Deletes this search

Use the Delete button to dispose of the search and remove it from all search managers.

**Close Button** - Closes this search editor window

Use the Close button when you are finished making changes and want to close the editor for this search.

**Search Button** - Performs this search

Use the Search button to test the settings you have just entered for this search. Right-Click to search forward from the current time of the marker. Left-Click to search backward from the current time of the marker. When you are satisfied with the search settings, you can close the search and use any search button in the application to continue searching. (see: [Searching](#)<sup>[178]</sup>)

### 5.6.1.1 Search Types

Searches are defined in terms of Signals matching specific criteria. Depending on the search type, one or more signals are selected and a match pattern, match value or other conditions are defined for each. All Boolean and Bus signals use the Pattern Search type and all other signals (including those derived from Plug-ins), use the Sequential Search type.

Sequential searches allow a sequence of match conditions consisting of fields within frames among a sequence of frames. Each field match can have a specific value or a "don't care" (Any) value, and a specific skip count or a skip count of "Any". With the sequential search a very long sequence, consisting of multiple wildcards (any Field, any Frame, any Field Value) and specific frame or field skip counts and specific Fields and Field values, can be defined to locate the proverbial "needle" in a very long "hay stack". Sequential searches also have the option of placing the match marker at a specific point in the match sequence.

Pattern searches match a pattern across multiple signals at a single point of time in the capture.

When ALL specified signals and conditions match the search criteria, the time of the match condition (or Match Point) will be centered in the window that has "focus". Any other windows that are a member of the same Link Group, will also center on the match point. (see: [Searching](#)<sup>[178]</sup>, [Link Groups](#)<sup>[177]</sup>)

Details of each search type are explained in the following sections.

- [Sequential Searches](#)<sup>[173]</sup>
- [Pattern Searches](#)<sup>[178]</sup>

#### 5.6.1.1.1 Sequential Searches

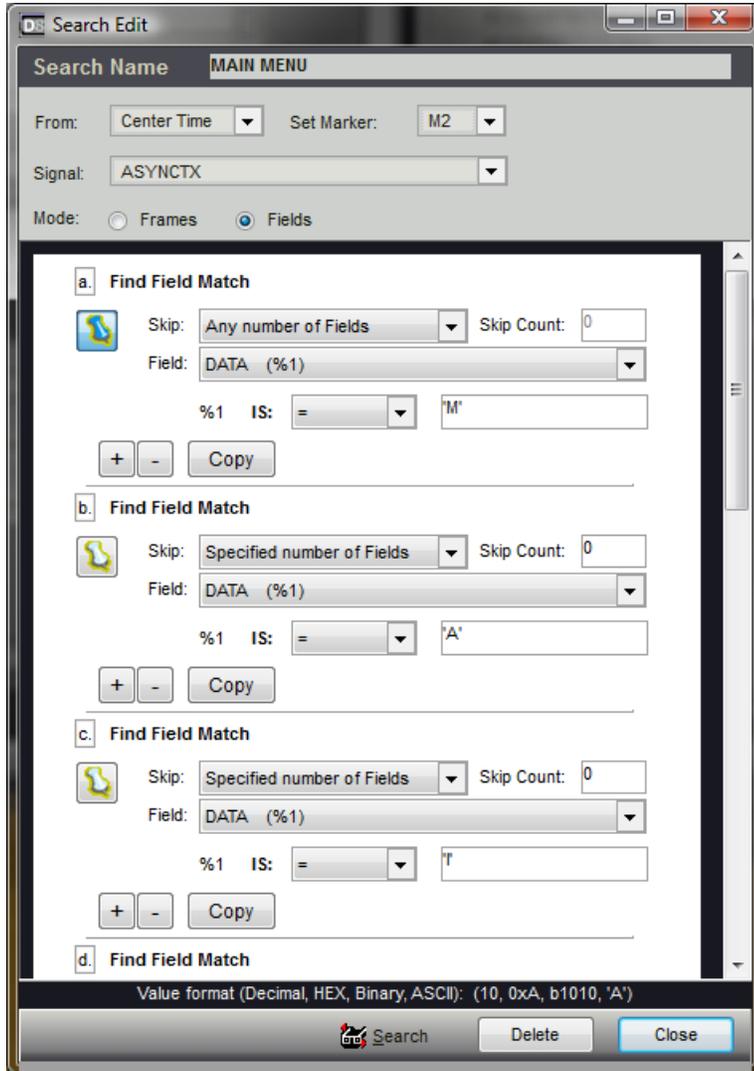
The Sequential search type is used by all Plug-ins or Parsed (decoded) signal types. This includes all signals except Boolean and Bus signals (see: [Define Searches](#)<sup>[172]</sup>).

This search type has a group of search terms (or criteria) that is specific to the chosen signal type,

and can perform a search sequence by adding additional terms. Terms can be added by using the Copy or More buttons.

By changing the Mode (Field or Frame) to Fields, you can target the search to sequentially match while ignoring frame boundaries. To look for a sequence of multiple frames, each having their own field sequence match, select the Frame mode. If frame information is not present in the data, the Mode will be limited to Field sequences.

### Field Mode



The number of Field terms is unlimited and each term is labeled using ASCII characters. In the image above, three field terms are visible (a., b., and c. ). Using term 'a.' as an example, each option is explained below.

## a. Find Field Match



**Push Pin button** - This identifies which point in the sequence will be marked as the match time in the search results. When selected, the 'Push Pin' will appear blue, indicating the marker selected for the search will be placed at the beginning of this specific match term. When de-selected, it will appear white, meaning another term in the sequence has been selected for the marker position. If all terms have been de-selected, the first term in the sequence will be selected automatically for the marker position.

**Skip and Skip Count** - Skip options are "Any number of fields" or "Specified number of fields". When set to "Any number of Fields", the search will ignore the skip count and continue searching for the next field that matches the criteria. The search will continue to the end of the captured data if necessary before reporting a 'no match'. However, when set to "Specified number of Fields", the search will only ignore (and skip) the number of fields specified in the skip count editor before looking for the next match. If the next term after the skip count does not match, then the search reports a 'no match'. Setting the skip count to a value of "0" instructs the search to analyze the very next field in sequence (Do Not Skip).

**Field** - Some Signal types will have many field identifiers that can be used for targeted searching. The Field selection can be used to choose the specific field type to search. If the field to consider for the match is not the type specified, then the result is a 'no match', even if the value for the field matches the specified value. The field selection options for the built-in Async Signal type are shown below.



**Value to Match** - Depending on the specific field type, 1 or more values can be specified for the match. Some fields do not have any additional values, so the search is a 'match' if the specified field is found (i.e. Parity Error above). Other fields may have several values within the field. Each value is referenced in the value editors with a preceding "%". As shown above, the 'DATA' field has 1 value, identified by "%1". Below is an example of the editor for the DATA field.



The value to search for can be specified in Decimal, HEX, Binary or ASCII format as demonstrated below.

Decimal - 77  
 HEX - 0x4D  
 Binary - b1001101  
 ASCII - 'M'

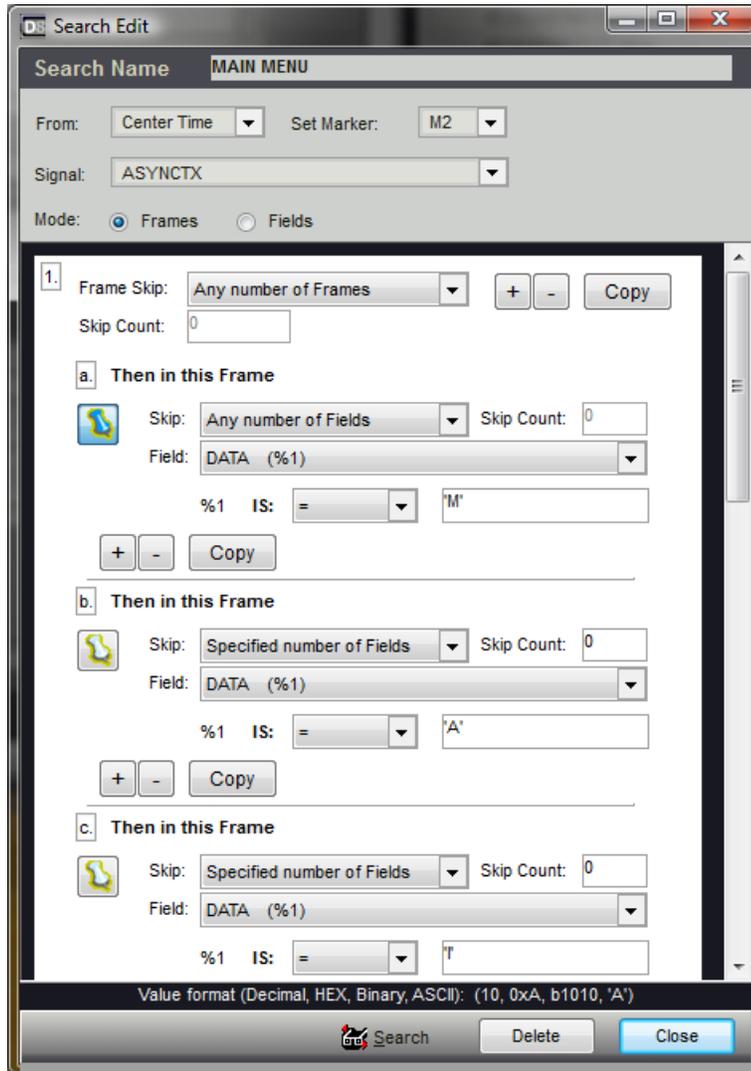
An example of a Field with more than 1 value (from the SPI signal type):

The screenshot shows a dialog box titled "a. Find Field Match". It contains the following elements:

- Skip:** A dropdown menu set to "Any number of Fields".
- Skip Count:** A text input field containing the number "0".
- Field:** A dropdown menu set to "MOSI-MISO (%1 : %2)".
- %1 IS:** A dropdown menu set to "ANY".
- %2 IS:** A dropdown menu set to ">=" with a text input field next to it containing "0xDE".
- Buttons:** Three buttons at the bottom left: a "+" button, a "-" button, and a "Copy" button.

**Buttons** - The three buttons on the bottom left of a field term are for deleting the current term (-), adding a new term below the current one (+) or creating and adding a duplicate of the current term (Copy).

## Frame Mode



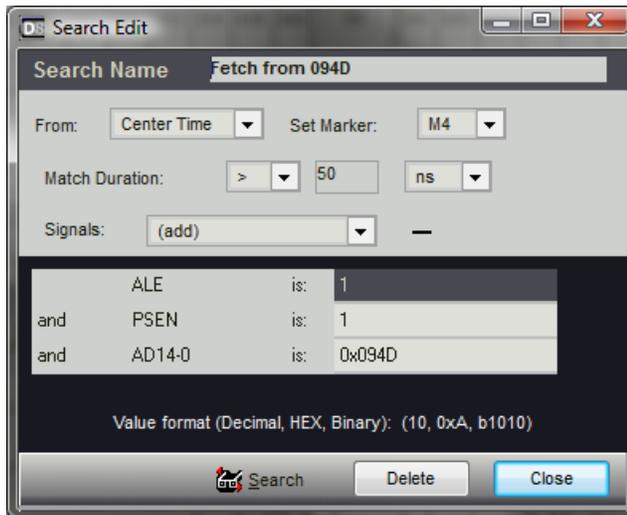
Frame mode uses the same logic as field mode but adds an additional layer of grouping if frame information is present in the data. The number of frame terms is not limited and each frame is labeled numerically, starting with "1".

**Skip and Skip Count** - The Skip and Skip Count parameters apply to Frames (a group of fields) instead of fields. The Field match sequence within each frame is limited to the fields bounded by framing data of the signal type. We do not limit the number of Field terms or skips within a frame. However, If you specify a sequence that involves a a greater number of fields than the number of fields available in the framed data, the search will fail.

**Buttons** - In frames, the Delete, Add and copy buttons are located at the upper right corner of the frame term and have the same functions as those described for fields, but apply to the frame. If you copy a frame, the new frame will be identical to the one copied, including all field terms and their individual settings.

5.6.1.1.2 Pattern Searches

The Pattern search type is used for Boolean or Bus signal types (see: [Define Searches](#)<sup>[172]</sup>, [Boolean Signals](#)<sup>[35]</sup>, [Bus Signals](#)<sup>[37]</sup>).



This search type can be used to find a value of one signal or a pattern of values in multiple signals, that lasts for a specified time period.

You can see in the "Fetch from 094D" search displayed above, that it will search for a pattern consisting of values from three signals (ALE, PSEN, AD14-0) that lasts for a duration of more than 50 nanoseconds. If this condition is found in the captured data, the specified marker will be set to the time when the match occurs. In the above example, this would be 50ns after the matching pattern begins.

**Match Duration:** Determines whether to skip all packets until a match is found, or to skip the number of packets specified in "Skip Count" and then see if the next packet is a match.

**Duration Units** The duration qualifiers can be in ns,us,ms or sec and can use REAL numbers (1.23 us).

**Signals:** Select a signal from this list to "add" them to the search. Signals added to the search are displayed below the signal selection box where the pattern to match can be edited.

**Match Pattern Format** The match patterns can be specified in decimal, hex or binary. To indicate a HEX specification, precede the number with '0x'. To indicate BINARY, precede the number with 'b'. Binary specifications allow '0','1' and 'X' (don't care) characters. HEX specifications allow HEX digits (0-1,A-F) or 'X' for a nibble of don't care bits. Decimal specifications must use only 0-9.

## 5.6.2 Searching

### Search Button

Left clicking on a search button searches back in time (previous match.) Right clicking on a search button searches forward in time (next match.) See [Define Searches](#)<sup>[172]</sup> for details on creating searches.

## Invoking Searches

There are several methods of invoking a search. Each presents a slightly different way of selecting the search and the target window, but they all perform the search in the same manner.

If the search is configured to search 'from center time', then the search starts from the center time of the FOCUSED window (possibly the last match). Otherwise the search starts from the search's marker position (possibly the last match). In either case, the marker is positioned at the location of the search match and then the FOCUSED window is centered on the marker. If the window is part of a link group, then the entire link group is centered as well (see: [Link Groups](#)<sup>[171]</sup>). The center time of the FOCUSED window does not change if the search fails.

Regardless of how the search is invoked, we actually always run the DEFAULT search on the FOCUSED windowed. We simply CHANGE the DEFAULT search or the FOCUSED window before running the search in some cases. This creates a very consistent environment where you can jump from one search button to another without surprises. The last invoked search is always the current DEFAULT search and the window under the mouse is always the currently FOCUSED window.

## Local Search

Each Data Table, List and Waveform window has a local search button. When you click on a window's local search button, that window becomes the FOCUSED window and then the search is applied to it as usual (using this newly FOCUSED window).

## Search Manger Searches

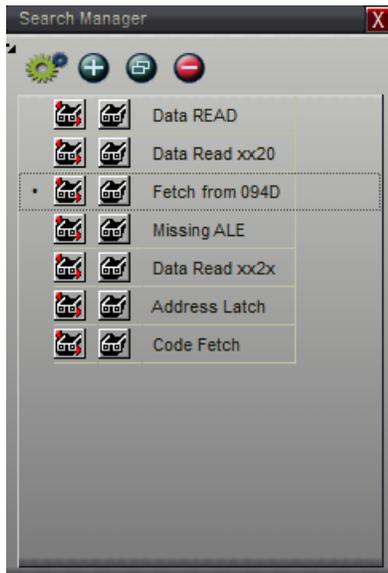
When you click on a search button in the search manager, the DEFAULT search is changed to that button's search and then the search is performed as usual (using this new DEFAULT search). However, the search will be performed on the Waveform View of the currently focused Link Group. (see: [Search Manager](#)<sup>[179]</sup>)

### 5.6.3 Search Manager Window

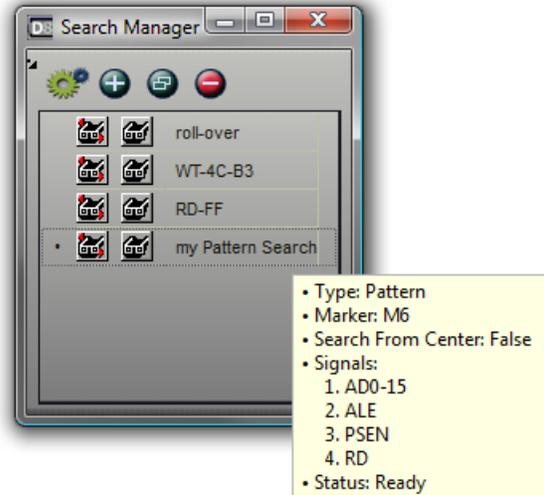
The search manager window shows a list of all defined searches (see: [Define Searches](#)<sup>[172]</sup>). It also provides an easy method of executing or editing any of the searches. This is particularly useful if you need to do a series of searches involving different search types.



To open the search manager, select the "Open Search Manager" button from the main toolbar. "**New Search Manager**" from the **Window** menu. Only one search manager can be open. If it is already open it will be focussed and placed in front of any other windows. The Search manager can be docked anywhere if desired however, since it always displays a list of already defined searches, it can be closed and opened as needed without losing any data.



Use the mouse to see details without having to edit the search



**Search** - Each entry in the list includes a Search button in the left column. Left-click or Right-click on the Search button to perform that search as described in the [Searching](#) section.

**Edit Search** - Each entry in the list includes an Edit button in the second column. Click on the Edit button to edit the parameters of a defined search.

**Set as the Active Search** - Click on the search name itself or use either of its buttons in the search manager and the search will automatically become the Active (or Global) search. Any search button in the program will perform the Active search.

**New** - Click the New button to select a signal and create a new search.

**Copy** - When the copy button is clicked, a new search is created identical to the current search. The new search is added to the Search Manager, renamed by adding a sequential number to the search name, automatically selected as the Global Search and is opened for editing. This is a very convenient feature if you want to add another search with similar criteria while retaining the original search or you need similar criteria for more than one signal.

**Delete** - Deletes the selected search.

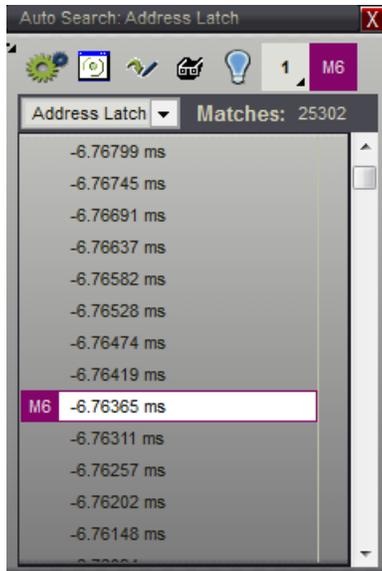
### 5.6.4 Auto Search Windows

Auto Searches expand the normal search to a linked list of positions in the captured data that meet the search criteria. Click on any line of the resulting list to scroll the matching data into view. Auto Searches also have the ability to halt the analyzer, determine which captures to preserve and which captures to discard based on the search result.

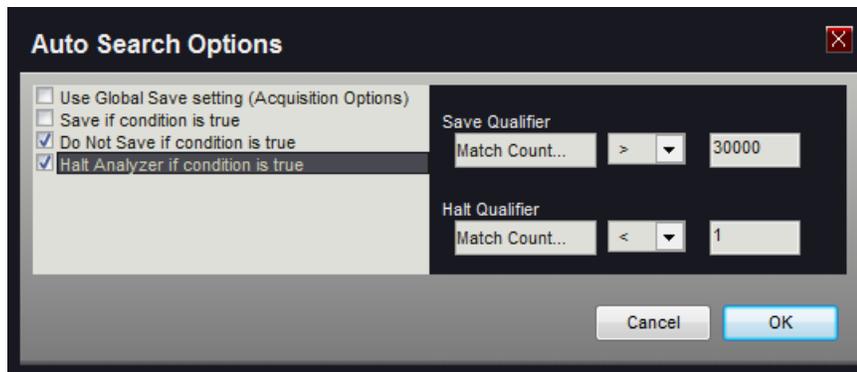
#### Main Auto Search Features

1. Automatically runs selected searches after each capture or [capture history](#) load.
2. User settings allow for halting, saving or skip-saving the capture based on match counts.
3. Presents a list of matches and the count.
4. Clicking on a search match will bring the highlighted or focussed Waveform View to the time

marked by the search match. All other views within the same link group as the waveform view will also update to the new time position.



**Save, No Save and Halt Options** - Click the Menu Button to set the Auto Search Options.



#### Use Global Save Settings

Select this option to let the default save settings determine when to save the capture. When selected, the Save Qualifier section is disabled. (see [Acquisition Options](#)<sup>[97]</sup>)

#### Save if Condition is True

Select this option to have the capture saved if the Save Qualifier equates to true. If the Global setting is already set to "Save" then this selection will have no effect. (see [Acquisition Options](#)<sup>[97]</sup>)

#### Do Not Save if condition is true

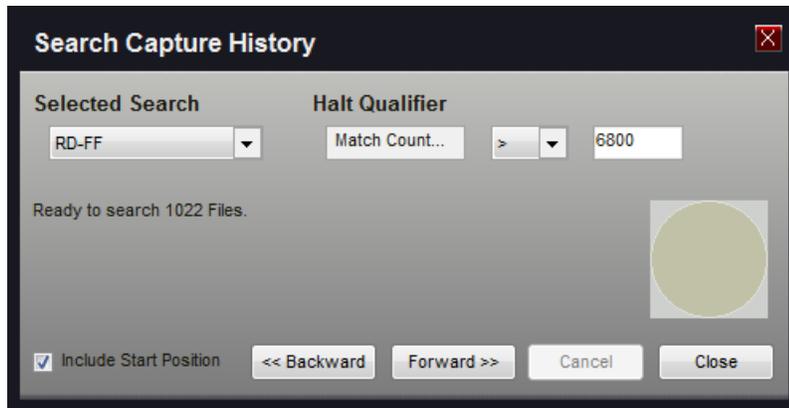
Select this option to mark the capture for "Discard" if the Save Qualifier equates to true. If the Global setting is already set to "Do Not Save" then this selection will have no effect. (see [Acquisition Options](#)<sup>[97]</sup>)

### Halt Analyzer if Condition is True

Select this option to stop the analyzer from continuing to capture if the Halt Qualifier equates to true.

## 5.6.5 Capture History Searching

The entire [Capture History](#)<sup>[120]</sup> can be searched forward and backward to find a capture with a search result that [matches](#) the halt qualifier specified.



### Selected Search

Any search that you have defined for this project will be listed in the search selection drop-down box. Choose the search you want to use from this selection (see [Searches](#)<sup>[172]</sup>, [Searching](#)<sup>[178]</sup>).

### Halt Qualifier

Select the Logic (>, <, =, <>, <=, >=) and enter the count for the search to match. Most of the time you may be looking for any file that results in a single match or more and would set the logic to ">=" and the count to "1". However, you may be looking for the "odd" capture that has far fewer or greater matches than the other captures so we have allowed for values up to 32 bits to be specified for the count.

### Include Start Position

This option controls whether the search includes the file at the current position or not. Check this option to include the current position when the search begins (forward or backward). This box will be set automatically if the selected search is changed or on any changes to the halt qualifier. This option is automatically cleared when the search of a capture file results in a match, which saves you the trouble of manually clearing it if you re-start the search from the matched position to continue searching for additional captures that match.

### Backward

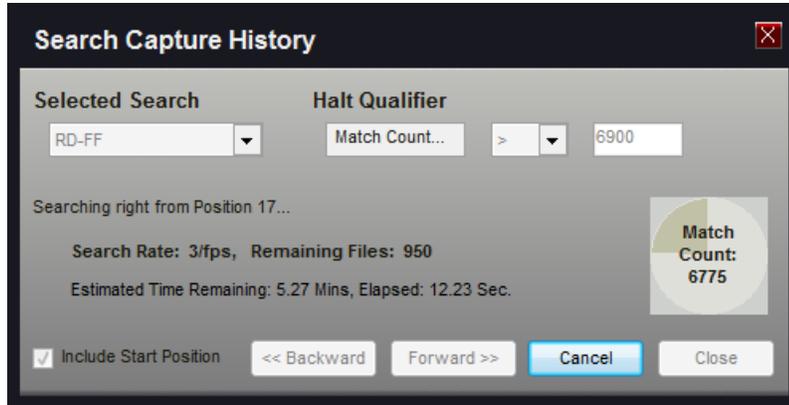
This button starts the search from the current position and proceeds towards the oldest capture until a match is found or the oldest capture has been searched. The file at the current position is only searched when the "include start position" option is selected.

### Forward

This button starts the search from the current position and proceeds towards the newest capture position until a match is found or the newest capture has been searched. The file at the current position is only searched when the "include start position" option is selected.

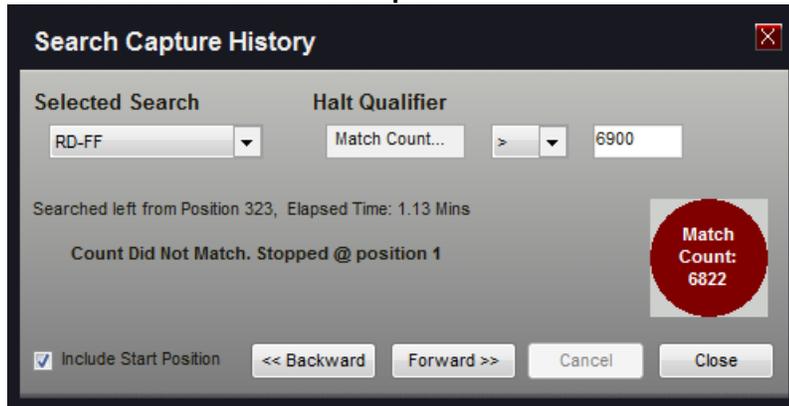
**Cancel**

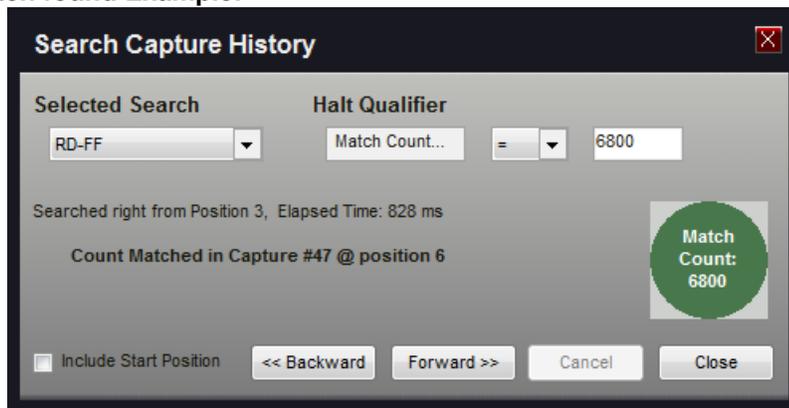
This button stops the search.

**Close**

This button closes the search window. The close button will not be available if a search is in progress. Cancel the search if you want to close the window. When the window closes it will remember your current settings.

When the search is halted or stops automatically, the capture file at the stopped position will be loaded and all windows updated with the new data.

**No Matches found or Cancel example:**

**Match found Example:****See Also:**

[Capture History](#) <sup>1201</sup>

# Exporting

**Part**



**VI**

## 6 Exporting

The captured data can be exported to a file in ASCII format for further analysis or documenting purposes. DigiView provides three export methods to choose from with each method having a few unique features. These features are documented in the next three sections:

- [Exporting All Signal Data \(Raw\)](#)<sup>[187]</sup>
- [Exporting From List Windows](#)<sup>[189]</sup>
- [Exporting From Table Windows](#)<sup>[191]</sup>

Properties common to all three export methods are discussed below.

The image shows two identical screenshots of the 'Export Capture ID: #1' dialog box. Each screenshot has a 'Disk Space' section on the right. The top screenshot shows 'Free Space: 73.88 GB' and 'Export Size: 2.57 TB' in red text, indicating a large export size relative to free space. The bottom screenshot shows 'Free Space: 73.88 GB' and 'Export Size: 55.21 MB' in black text, indicating a smaller export size.

### Time Range

Select the Starting time and Ending time of the data to export. You can select from several predefined time points (i.e. Waveform View 1 Start, Trigger, Marker 3, etc) or select Custom to manually enter the time.

### File

The image shows a 'File' field with the text 'C:\Users\jamie\Documents\TechTools\DigiView\Export\export.csv'. To the right of the field are two buttons: 'Select Destination' and 'Refresh'.

Below the Time Range options, the file name and path for the export file will be displayed. To change the name or location, chose the "Select Destination" button to the right of the filename. You can chose any valid storage device for your system including a Network Drive, Floppy Disk, FLASH Memory, and etc.

### Estimated Free Disk Space

The available space of the export destination is calculated and displayed here. The available space will be calculated whenever the destination changes. While the export is in progress, this will be updated to keep you informed of remaining space. If the available space becomes too small for the remaining portion of the export, then the export will automatically finish without exporting the rest of the data.

### Required Disk Space

The amount of disk space required to hold the exported data will be displayed here. Since all storage devices require a minimum amount of space to hold a file, the minimum file size will be shown if the exported data is smaller. If the export size is very large, the background color of this display will turn to yellow. If the export size exceeds the available space on the storage device, the background color will turn to red. Even though the estimated size is larger than available space, you can still perform the export which will automatically halt when disk space becomes critical. The export size will be calculated whenever any option or the destination changes.

### Progress indicator



The lower left portion of the Export dialog will display the progress of the export. The progress display will indicate the number of bytes already exported, the percentage of the data already exported and the number of bytes per second being written to the storage device.

### Stop Button

The export can be canceled at any time by selecting the Stop button. All data exported up to the point of cancellation will be available in the exported file.

### Export Button

After selecting the desired export options, choose this button to begin the export. This button will be disabled while an export is in progress.

### Export+ Button

After selecting the desired export options, choose this button to export all Capture History files from the current capture to the most recent capture. When exporting is completed, the current capture is reloaded. This button will be disabled while an export is in progress.

### Export++ Button

After selecting the desired export options, choose this button to export the entire Capture History. When exporting is completed, the current capture is reloaded. This button will be disabled while an export is in progress.

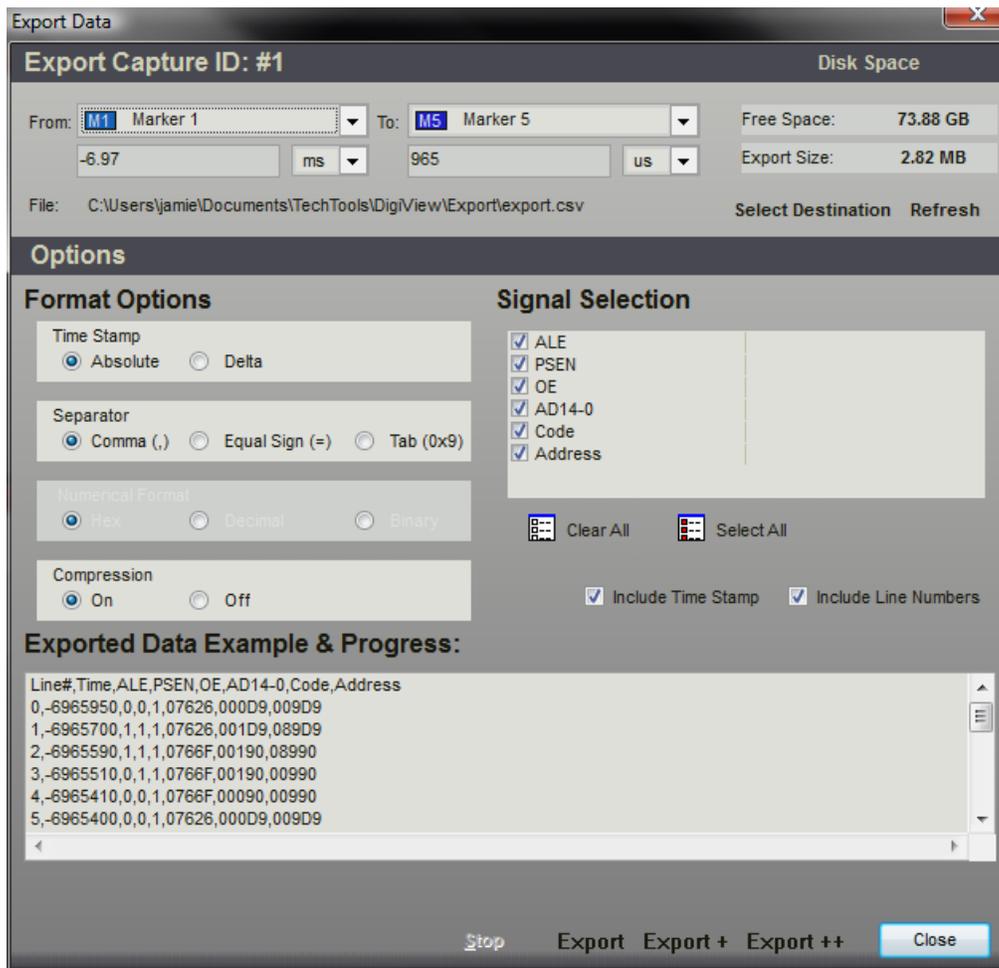
### Close Button

To exit the Export window, choose this button. If an export is in progress, the export will be canceled automatically.

## 6.1 Exporting All Signal Data

This export method can be selected from the Main menu (Menu->Export->UnDecoded Capture) and provides a means of exporting the raw data of all defined signals. The available options let you choose which signals to export, time format, numerical format, field separator, inclusion of line numbers, inclusion of a timestamp and whether to use compression. (see: [Exporting](#)<sup>[186]</sup>)

The Exported Data Example area will be updated automatically to reflect any changes in export options.



### Timestamp

If the "Include Time Stamp" option is selected, the time field will be formatted as the absolute time or (if set to Delta) as the time since the previous sample (or the last known sample after the starting time). If the "Data Compression" option is set to OFF and this option is set to Delta, then the time field will show the sample rate.

### Numerical Format

This option determines the formatting for each signal that uses more than one channel (Boolean signals will always be formatted as a '1' or '0'). This option will display the format setting of a signal when a signal is selected. To change the format for a signal, first select the signal in the Signal Selection area. If changes are allowed for the selected signal, then the format options will "enable". Select the desired option.

### Field Separator

Chose the character for separating each item on a line of exported data.

### Include Line Numbers

Select this option to include a consecutive line number at the beginning of each line.

**Include Time Stamp**

Select this option to include the time of each exported sample.

**Signal Selection**

Check each signal to include in the export. The order of export is determined by the order in which each signal is checked. To have the export order match the listed order, use the Clear All button to clear all selections, then use the Select All button to select all the signals in the order shown. To move a signal to the end of the export line, uncheck and then recheck the signal.

When a signal is highlighted with the mouse, its export format setting will be shown in the Numerical Format option. This option can be changed by selecting the desired format (excluding Boolean signals).

**Data Compression**

Setting this option to ON will greatly reduce the size of the export file. With compression on, the redundant or "dead" periods of data will be excluded and only changes in the data will be exported. If this option is set to OFF, then no data will be eliminated and all samples at the maximum resolution will be exported. This could lead to very long exports with sizes up in the Terabyte range.

**Clear All Button**

Use this button to "uncheck" all signals in the Signal Selection Area. Unchecked signals will be excluded from the export.

**Select All Button**

Use this button to "check" all signals in the Signal Selection Area. All checked signals will be included in the export.

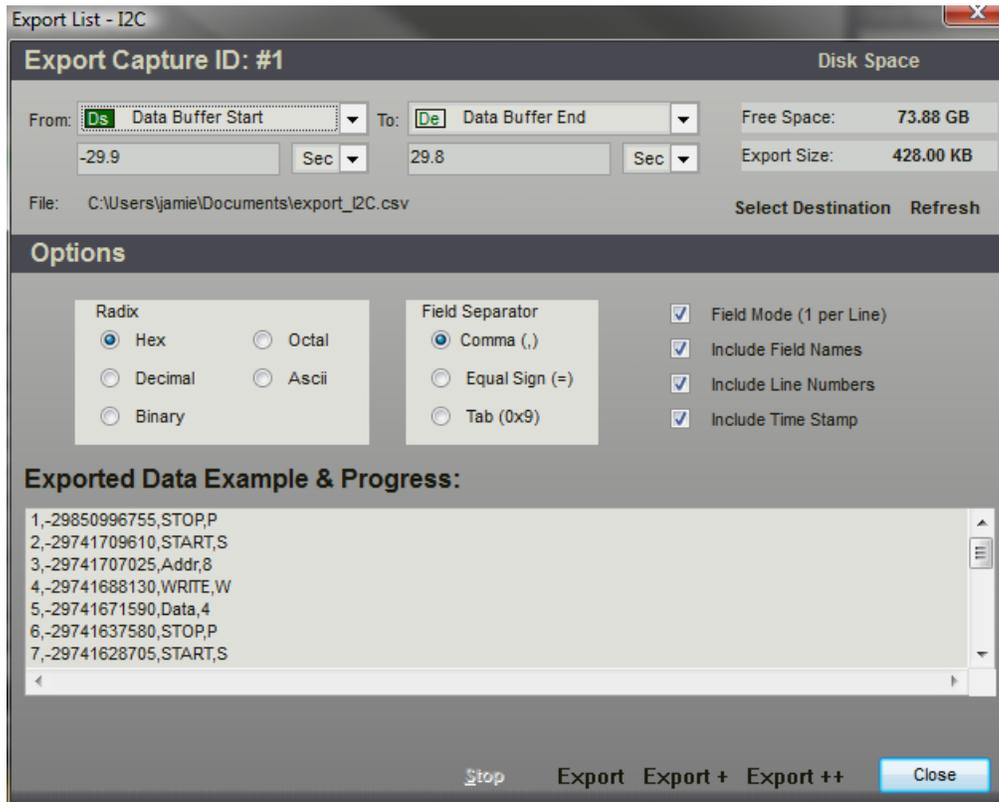
**Exported Data Example**

This area provides an instant "preview" of the data to export and is updated when any option or signal selection is changed.

## 6.2 Exporting from List Windows

This export method can be selected from the Main menu (Menu->Export->Table/List) or directly from a List Window's menu. List Exports export the decoded data of higher level signals (such as I2C), and will have a slightly different set of options that are specific to each signal type. (see: [Exporting](#)<sup>[186]</sup>, [Signal Types](#)<sup>[31]</sup>, [List View Windows](#)<sup>[166]</sup>)

The Exported Data Example area will be updated automatically to reflect any changes in export options.



### Numerical Format (Radix)

This option determines the formatting for each signal that uses more than one channel (Boolean signals will always be formatted as a '1' or '0'). This option will display the format setting of the signal in the list view being exported. To change the format for exporting, select the desired option.

### Field Separator

Choose the character for separating each item on a line of exported data.

### Field Mode

Select this option to force each field to a new line when framing data is present. Uncheck this option to output a frame of fields per line.

### Include Field Names

Select this option to include the Field name in the export.

### Include Line Numbers

Select this option to include the line number at the beginning of each line.

### Include Time Stamp

Select this option to include the time of each exported sample.

### Exported Data Example

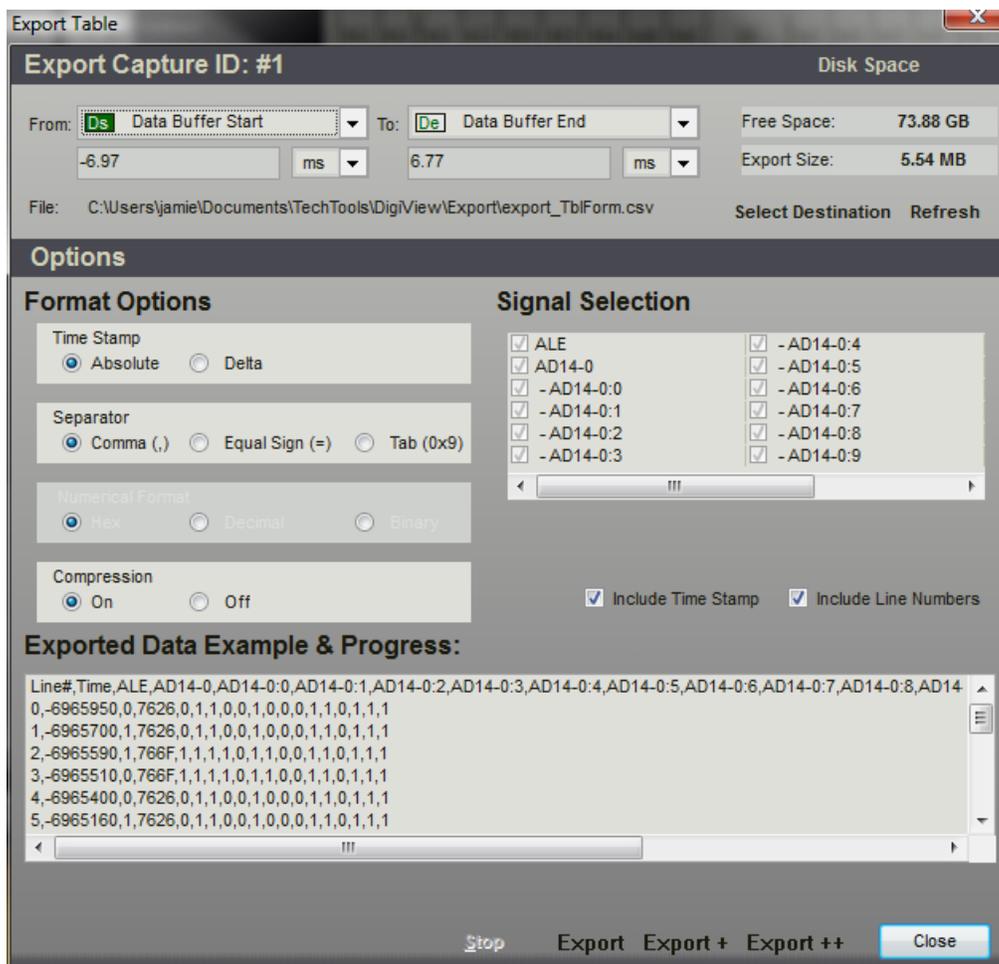
This area provides an instant "preview" of the data to export and is updated when any option or signal format is changed.

## 6.3 Exporting from Table Windows

This export method can be selected from the Main menu (Menu->Export->Table/List) or directly from a Table Window's menu. Table Exports provide all the same options as the "Export All" function, but will automatically include all columns of the table. This means you will not have to select which signals to export, plus all channels of any signals that are "expanded" will also be included in the export. This is the only export method that will export expanded channels. (see: [Exporting](#)<sup>[186]</sup>, [Export All](#)<sup>[187]</sup>, [Table Windows](#)<sup>[163]</sup>)

Tables display and export signals in their "raw" data format. If you need to export the decoded data of higher level signals (such as I2C), then the List Export should be used instead. (see: [List Export](#)<sup>[189]</sup>, [I2C Signals](#)<sup>[45]</sup>)

The Exported Data Example area will be updated automatically to reflect any changes in export options.



### Timestamp

If the "Include Time Stamp" option is selected, the time field will be formatted as the absolute time or (if set to Delta) as the time since the previous sample (or the last known sample after the starting time). If the "Data Compression" option is set to OFF and this option is set to Delta,

then the time field will show the sample rate.

**Numerical Format**

This option determines the formatting for each signal that uses more than one channel (Boolean signals will always be formatted as '1' or '0'). This option will display the format setting of a signal when a signal is selected. To change the format for a signal, first select the signal in the Signal Selection area. If changes are allowed for the selected signal, then the format options will "enable". Select the desired option.

**Field Separator**

Choose the character for separating each item on a line of exported data.

**Include Line Numbers**

Select this option to include a consecutive line number at the beginning of each line.

**Include Time Stamp**

Select this option to include the time of each exported sample.

**Signal Selection**

All Signals in the Table are automatically displayed in this area and "checked" for export. To exclude a signal from the export, cancel the export, remove the signal from the Table, then select export again. Optionally you could use the Export All function if you do not need to export the channels of "Expanded" signals. (see: [Export All](#)<sup>[187]</sup>)

When a signal is highlighted with the mouse, its export format setting will be shown in the Numerical Format option. This option can be changed by selecting the desired format (excluding Boolean signals).

**Data Compression**

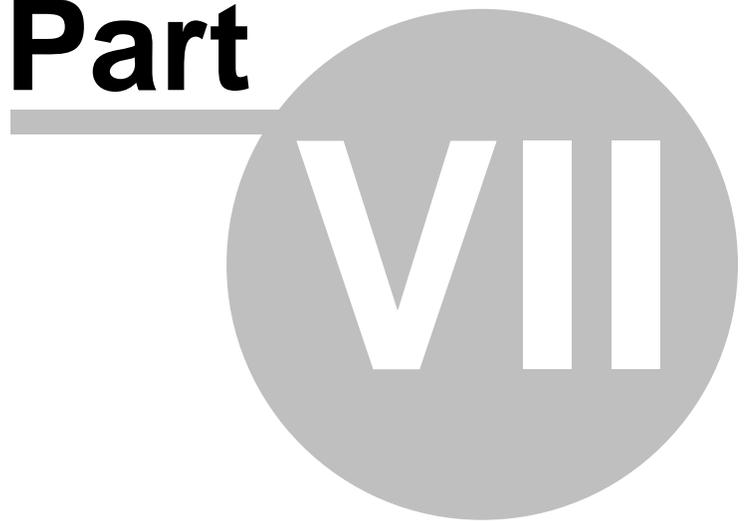
Setting this option to ON will greatly reduce the size of the export file. With compression on, the redundant or "dead" periods of data will be excluded and only changes in the data will be exported. If this option is set to OFF, then no data will be eliminated and all samples at the maximum resolution will be exported. This could lead to very long exports with sizes up in the Terabyte range.

**Exported Data Example**

This area provides an instant "preview" of the data to export and is updated when any option or signal format is changed.

# Printing and Saving Images

**Part**



**VII**

## 7 Printing and Saving Images

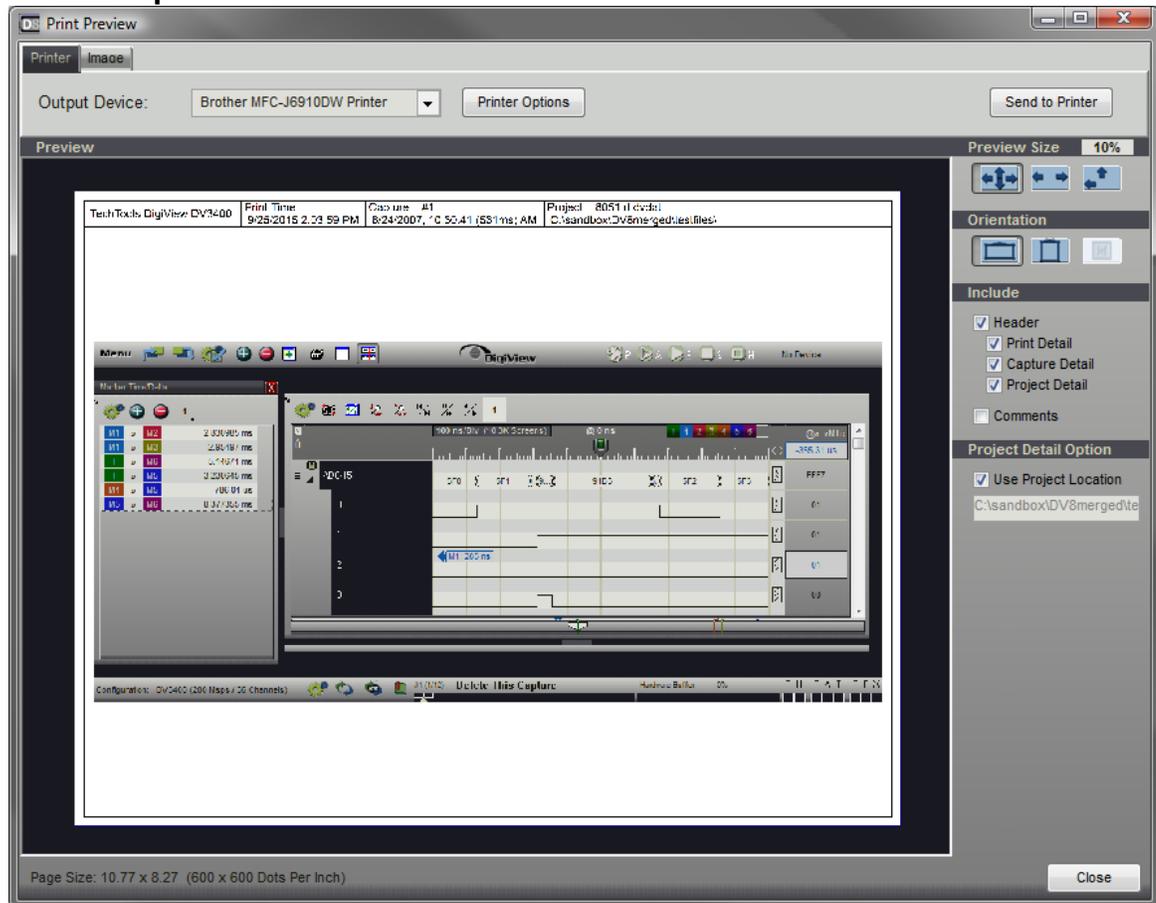
While analyzing the data, you may want to save a specific view to a graphic file or send it to a printer. Both of these functions can be done from DigiView's Print Preview window. To open the Print Preview window, select the "Print" or "Save Image" option from the menu of any window you want to print.

To Print using the main menu select **Main Menu-> Print** and then select the window from the list. To Save an Image using the main menu select **Main Menu-> Save Image** and then select the window from the list.

Both lists include a selection for the Main Window and any feature window you have added to the project. To print or save an image of just a waveform view, use the Waveform View's local menu.

After selecting what you want to print and opening the Print Preview window, you can switch between printing and saving an image by clicking on the tabs at the top of the window. Most of the options are the same between the two methods of output with the differences being the output size, resolution and orientation.

### Print Example

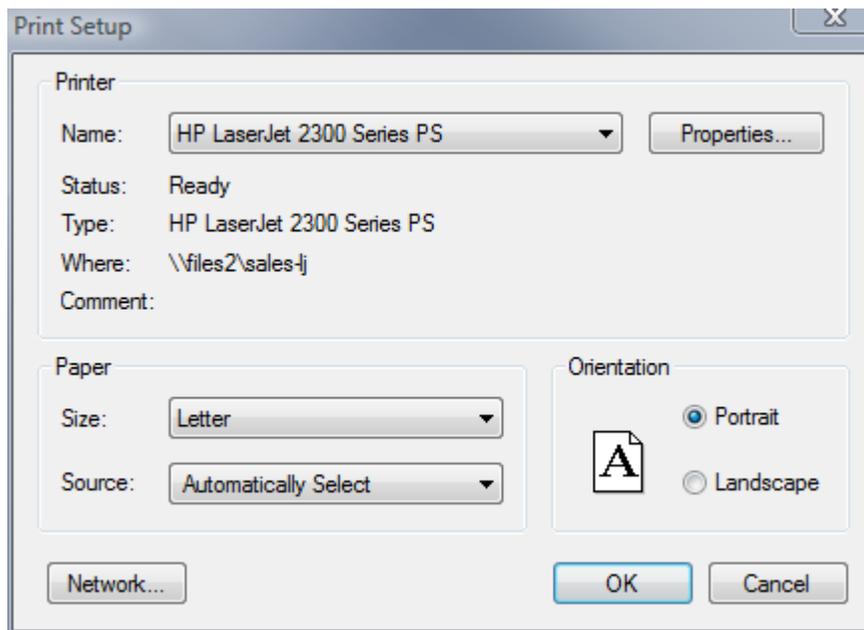


## Print Specific Options

### Output Device

A pull down selection list of all available print devices. Use this option to select the Printer, Fax or PDF print driver. After making a selection, the Page Size information and the preview will update to match the properties of the print device. The size of the printable area (followed by the print resolution) is displayed in the lower left corner.

To change the properties of the selected print device use the "Printer Options" button beside the selection list which will open the Print Setup window.



### Orientation



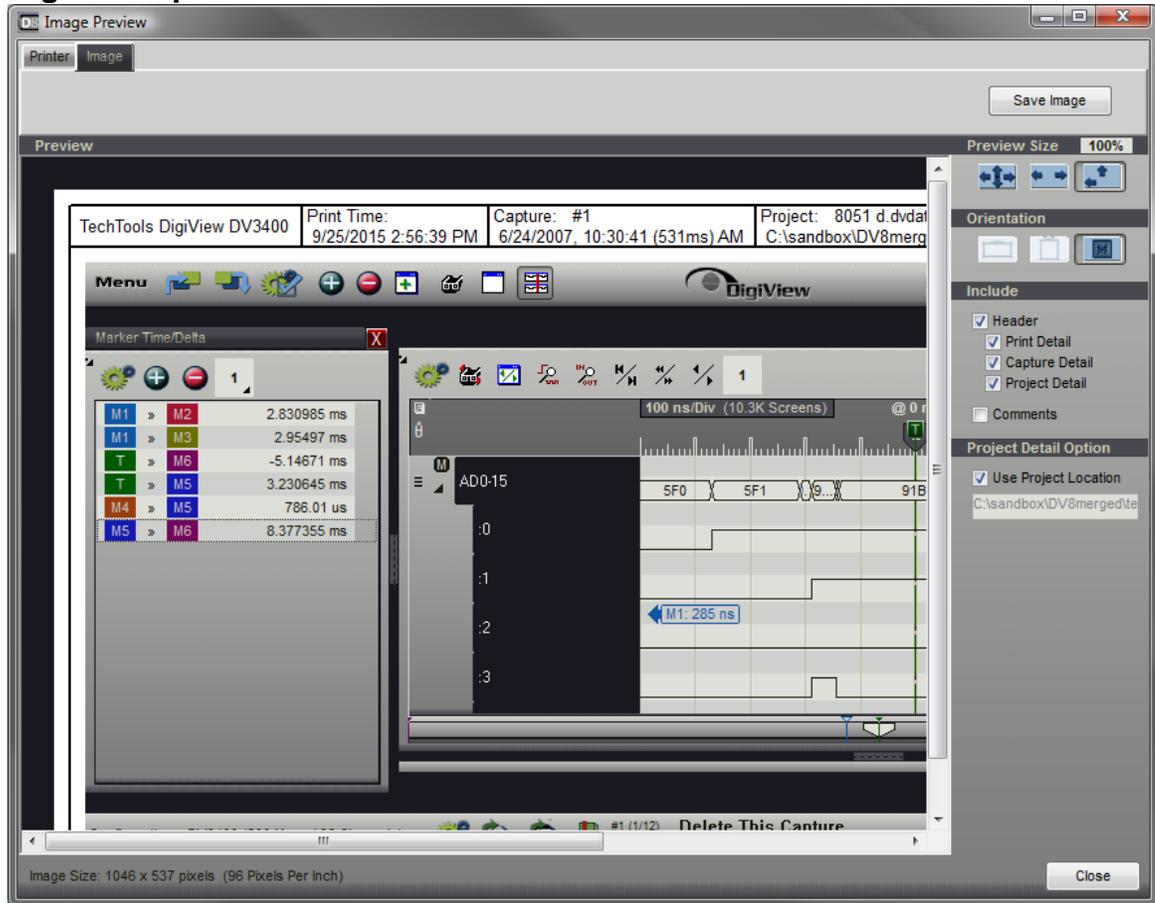
Print devices allow you to change the orientation of the output switching between Landscape (horizontal) and Portrait (vertical). You can do this in the Print Setup window by selecting the "Printer Options" button or use the orientation buttons. If you change this setting in the Setup window the orientation buttons will change to match. Advanced options for the print device can be accessed by using the "Properties" button in the Print Setup window.

For print output, the actual printed image will adjust to fit within the printable area and orientation of the Print Device and allows for spacing needed by the border, header and comments if selected.

### Send to Printer

Press this button to send the preview to the print device.

### Image Example



### Image Specific Options

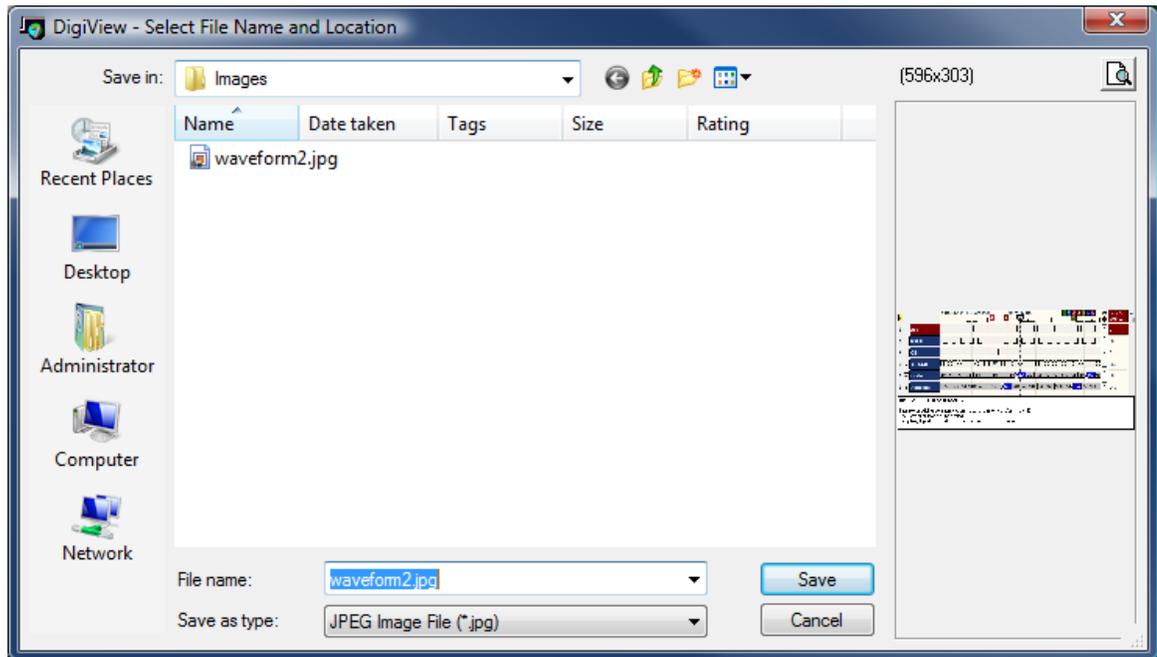
#### Orientation



The orientation of the Image is fixed to its screen orientation and "Size by Content" is permanently selected. The content of the image remains fixed but the output is sized to include the border area, header and comments if selected. The final output size is displayed in pixels at the lower left corner of the window and followed by the resolution (pixels per inch).

#### Save Image

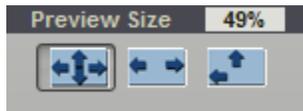
Press this button to save the preview as a JPEG image file. You can select the file name and destination or cancel the save using the Image selector window that appears.



## General Preview Options

### Preview Size

Adjusting the window size will automatically re-scale the preview unless the no-scale option is selected.



**Scale to Height and Width** - The preview is scaled to completely fit in the window so no scroll bars are needed.

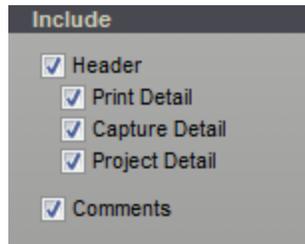


**Scale to Width** - The preview is scaled to fit the width of the window. A vertical scrollbar will appear if the preview height is taller than the window display area.



**No Scale (actual size)** - The preview is not scaled and the preview is displayed at 100%. For print output this could be very large depending on the properties of the selected print device. The vertical and horizontal scrollbars will appear if needed.

### Items to Include



**Header** - When selected a Header space is included at the top of the output with the Analyzer Model printed on the left. If no other header options are selected, the rest of the area will remain blank.

Optional items to include in the header:

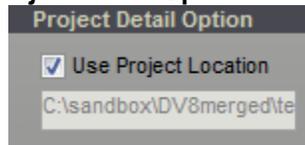
**Print Detail** - Select this option to include the Print Date and Time in the header.

**Capture Detail** - Select this option to include The Capture Date and Time and the Capture ID number in the header.

**Project Detail** - Select this option to include the project file name in the header. The additional "Project Detail" option controls whether the project path is also included or if a custom caption is included.

**Comments** - When selected the Comment Options and Editor will be visible and included in the output.

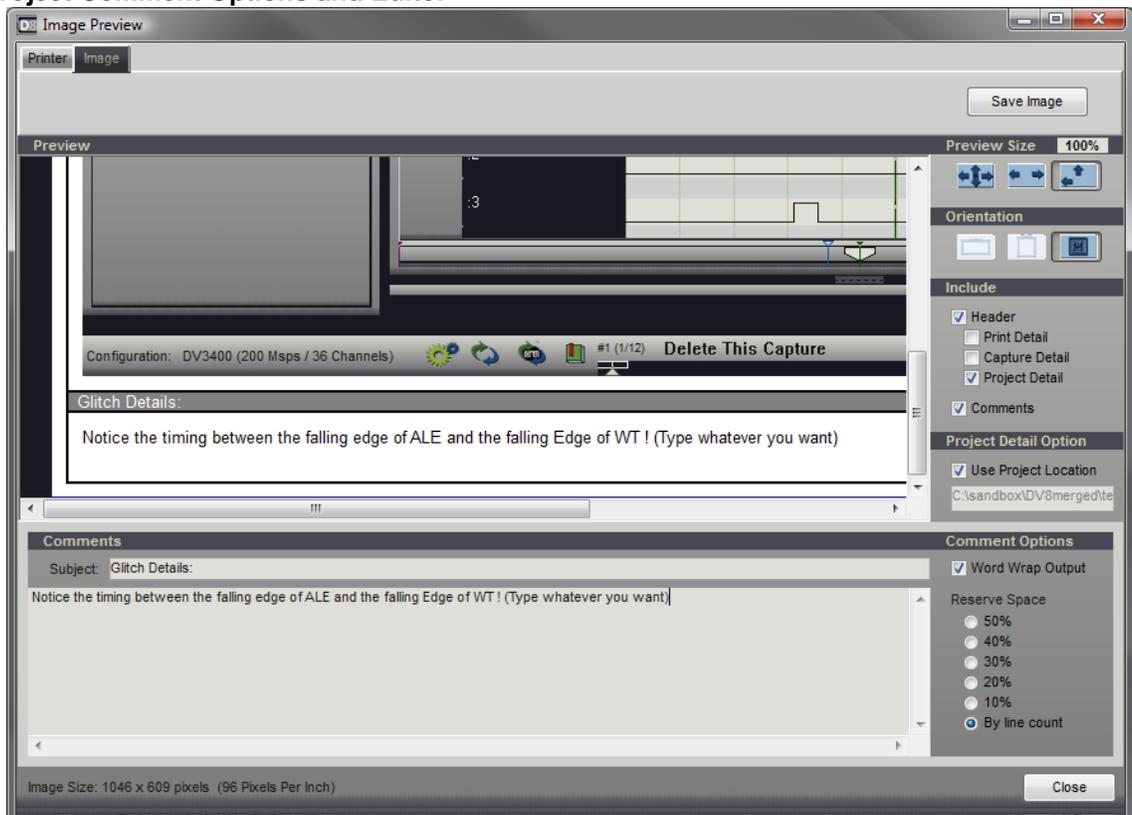
### Project Detail Option



If you select Use "Project Location", the project path will be used for the project detail beneath the project name. To enter custom text for the detail option just uncheck the "Project Location" option and type your text in the edit box just below it. Your custom text (or blank text if desired) will appear in the header beneath the project's file name.

If you re-select this option the path will appear in the edit box and the custom text is remembered. if you uncheck this option later, the custom text is restored.

## Project Comment Options and Editor



The comment editor and options will be visible if you selected to include comments in the include section.

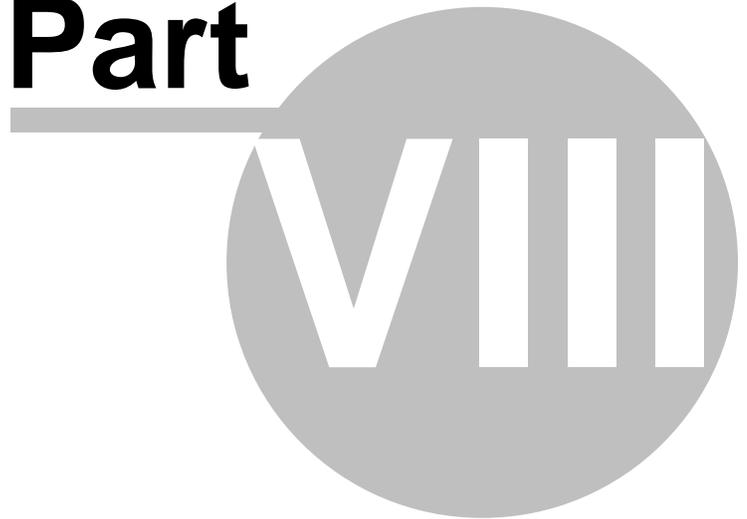
The default comment options (shown above) are set so you can type as many lines as you want and not worry about line spacing or formatting where each line ends. These are "Word Wrap Output" enabled and Reserve space set to "By Line Count". With these two options set, the output adjusts to accommodate the entire text in the output. For images the height grows by the needed (or selected) space. On print output (which has a fixed printable area) the content is reduced by the amount of space for the comment.

If you only want to reserve a specific portion of the output for comments (even without typing a comment) set the "Reserve Space" option to the desired percentage (10% to 50%).

**Subject** - Type anything here and it will appear above the comment section in the output. The example above has "Glitch Details" entered instead of the default of "Comments".

# Appendices

**Part**



## 8 Appendices

- [DigiView Compression](#) <sup>[201]</sup>
- [Hardware Specifications](#) <sup>[204]</sup>

### 8.1 DigiView Compression

**There is no need to understand DigiView's compression to use it. This is just here for the curious (or skeptical).**

We want two conflicting features in a logic analyzer; high sample RATES (high resolution) and high sample COUNTs (a lot of data/time). We usually reduce sampling RATES to capture more data because sample COUNTs (data buffer depth) is fixed. To combat this trade-off, the sample buffer is made as deep as possible. However, this approach is linear and does not scale well. Doubling the buffer doubles either TIME or sample RESOLUTION. It can take gigabytes of memory to achieve both if your data transitions are fairly sparse (microsecond or more gaps).

Ideally, we would like to have high sample RATES AND high sample COUNTs to capture a long time-span with high resolution.

DigiView achieves this, like other logic analyzers, by using a deep data buffer. However, DigiView also attacks this problem from another, even more effective angle. DigiView uses one or more **real-time, hardware based compression** techniques to compact the captured data. This has a much greater impact than increasing the buffer depth.

Most data you are likely to monitor lends itself well to our compression technique(s). Compression ratios of 100:1 are common. With sparse data, compression ratios of over 200,000:1 are achievable. Since the degree of compression depends on the amount of activity, you will achieve maximum compression if you only define signals of interest. DigiView analyzers will always sample at the maximum rate for the mode selected. Due to automatic real-time compression techniques, you receive the benefits that down-sampling would achieve (longer captures) without the loss of data resolution.

The data captured in logic analyzer applications is often stable for multiple sample periods (particularly at higher sample rates). This, coupled with fast sample times and a very long run-length limit, makes our compression very applicable in real-world applications.

To illustrate the effect of DigiView's compression and also present it in a manner that is more relevant to real-world usage, we have calculated several typical performance benchmarks for each DigiView Model and sampling mode. You may actually see better performance ratings than the conservative estimations below.

	DV310	DV320	DV340	DV310	DV320	DV340	DV350
	9	9	9	0	0	0	0
<b>Sample Depth</b> ( SR: Sample Rate, DR: Data Rate, Q: Quadrillion or 10 <sup>15</sup> )							

	DV3109	DV3209	DV3409	DV3100	DV3200	DV3400	DV3500
Theoretical Min (SR = DR)	512K x 9	512K x 9	1M x 9	512K x 18 512K x 9	512K x 18 1M x 9	512K x 36 1M x 18	1M x 36 2M x 18
Practical Min (SR = 4 x DR)	1M x Channel width						2M x Channel width
@ DR = 25Mbps (40ns)	1M x 9	2M x 9	4M x 9	1M x 18 2M x 9	2M x 18 4M x 9	2M x 36 4M x 18	4M x 36 8M x 18
@ DR = 10Mbps (100ns)	2.5M x 9	5M x 9	10M x 9	2.5M x 18 5M x 9	5M x 18 10M x 9	5M x 36 10M x 18	10M x 36 20M x 18
@ DR = 100Kbps (10us)	250M x 9	500M x 9	1B x 9	250M x 18 500M x 9	500M x 18 1B x 9	500M x 36 1B x 18	1B x 36 2B x 18
@ DR = 10Kbps (100us)	2.5B x 9	5B x 9	10B x 9	2.5B x 18 5B x 9	5B x 18 10B x 9	5B x 36 10B x 18	10B x 36 20B x 18
Theoretical Max (DR approaches 0) (Quadrillion)	3Q @ 10ns (347 days)	3Q @ 5ns (173 days)	6Q @ 2.5ns (173 days)	3Q @ 10ns (347 days) 3Q @ 5ns (173 days)	3Q @ 5ns (173 days) 6Q @ 2.5ns (173 days)	4.5Q @ 5ns (260 days) 9Q @ 2.5ns (260 days)	9Q @ 4ns (520 days) 18Q @ 2ns (520 days)
<b>Typical Captures @ Full Resolution</b> ( data type / count stored in hardware buffer )							
0.1Hz clocks	87,000					131,000	262,000
1KHz clocks	87,000					131,000	262,000
5KHz clocks	131,000						262,000
25MHz clocks	131,000						262,000
Async characters	47,000						94,000
I <sup>2</sup> C characters	10,000						20,000

	DV310 9	DV320 9	DV340 9	DV310 0	DV320 0	DV340 0	DV350 0
Sync characters	12,000						24,000
8051 Bus cycles	40,000						80,000

**Final note:** the data is compressed in real-time with dedicated hardware and is NEVER fully de-compressed (which could result in data files much larger the available hard-drive capacities). DigiView software transfers the entire compressed data buffer from the hardware to internal PC memory in compressed form. This allows us to transfer the entire buffer in about 1 second. The waveform display routines fetch only enough data from the compressed memory buffer to fill the viewable portion of the display screen and even that is compressed.

## 8.2 DigiView Hardware Specifications

	DV31 09	DV32 09	DV34 09	DV31 00	DV32 00	DV34 00	DV35 00
Sample Rate (MSPs)	100	200	400	100 @ 18 ch 200 @ 9 ch	200 @ 18 ch 400 @ 9 ch	200 @ 36 ch 400 @ 18 ch	250 @ 36 ch 500 @ 18 ch
Sample period (ns)	10	5	2.5	10 @ 18 ch 5 @ 9 ch	5 @ 18 ch 2.5 @ 9 ch	5 @ 36 ch 2.5 @ 18 ch	4 @ 36 ch 2 @ 18 ch
Channels	9 (x 1)	9 (x 1)	9 (x 1)	9 (x 2)	9 (x 2)	18 (x 2)	9 (x 4)
Threshold Circuits	1					2	
Adjustable Threshold	+0.5V to +2.8V					-6V to +6V	-5V to +5V
Threshold Accuracy	+- 250mv						
Trigger Output (BNC)	No					Yes	
Trigger position	Selectable (0-100%)						
Buffer Size	Selectable (0-100%)						
Raw Memory	9 Mbit (512K x 18)					18 Mbit (512K x 36)	36 Mbit (1M x 36)
Real-time Compression	Yes, Tri-mode (varies according to transition frequency, duration of changes and duration of constant change)						
<b>Sample Depth</b> ( SR: Sample Rate, DR: Data Rate, Q: Quadrillion or 10 <sup>15</sup> )							
Theoretical Min (SR = DR)	512K x 9	512K x 9	1M x 9	512K x 18 512K x 9	512K x 18 1M x 9	512K x 36 1M x 18	1M x 36 2M x 18
Practical Min (SR = 4 x DR)	1M x Channel width						2M x Channe l width
@ DR = 25Mbps (40ns)	1M x 9	2M x 9	4M x 9	1M x 18 2M x 9	2M x 18 4M x 9	2M x 36 4M x 18	4M x 36 8M x 18
@ DR = 10Mbps (100ns)	250M x 9	500M x 9	1B x 9	250M x 18 500M x 9	500M x 18 1B x 9	500M x 36 1B x 18	1B x 36 2B x 18

	DV31 09	DV32 09	DV34 09	DV31 00	DV32 00	DV34 00	DV35 00
@ DR = 10Kbps (100us)	2.5B x 9	5B x 9	10B x 9	2.5B x 18 5B x 9	5B x 18 10B x 9	5B x 36 10B x 18	10B x 36 20B x 18
Theoretical Max (DR approaches 0) (Quadrillion)	3Q @ 10ns (347 days)	3Q @ 5ns (173 days)	6Q @ 2.5ns (173 days)	3Q @ 10ns (347 days) 3Q @ 5ns (173 days)	3Q @ 5ns 6Q @ 2.5ns (173 days)	4.5Q @ 5ns 9Q @ 2.5ns (260 days)	9Q @ 4ns 18Q @ 2ns (520 days)
<b>Typical Captures @ Full Resolution</b> ( data type / count stored in hardware buffer )							
0.1Hz clocks	87,000					131,00 0	262,00 0
1KHz clocks	87,000					131,00 0	262,00 0
5KHz clocks	131,000						262,00 0
25MHz clocks	131,000						262,00 0
Async characters	47,000						94,000
I <sup>2</sup> C characters	10,000						20,000
Sync characters	12,000						24,000
8051 Bus cycles	40,000						80,000
<b>Trigger Circuitry</b>							
Operating speed (MHz)	100	200	200	100	200	200	250
Min Data Valid for Pattern Match (ns)	10	5	5	10	5	5	4
Min Data Valid for Edge Detection (ns)	10	5	5	10	5	5	4
<b>Electrical</b>							
Impedance	>5KOhm // <10pf @ (0-3.3V) <10pf @ (<0, >3.3V)				>5KOhm //		50KOh ms // < 3pf
Power Source	USB					External	
Power (Idle / Active)	<.5 Watt / < 2.5W					2.5 Watt /	

	DV3109	DV3209	DV3409	DV3100	DV3200	DV3400	DV3500
						< 7 Watt	
Maximum voltage (Continuous, all channels)	+-20 Volts					+-50 Volts	
Ground current Protection (ground lead to +- voltage)	Yes, +-12 Volts						
Anti-static protection	Yes						
Connection Type, Speed	USB 2.0 @ 480 Mbps						
<b>Mechanical</b>							
Size (LxWxH)	4.75" x 2.8" x .75"					5.0" x 4.25" x 1.40"	
Materials	Extruded Aluminum						

**Trigger Specifications**

	DV3109	DV3209	DV3409	DV3100	DV3200	DV3400	DV3500
Trigger Sequencers	Configurable: 1@16 stages, OR 4@4 stages, OR 2@8 stages, OR 1@8 and 2@4 stages, OR 1@12 and 1@4 stages						
Trigger Match Circuits	8 Universal Match Circuits. Each Circuit can be configured for any of the following: Edge Detect (Full Channel Width - OR: rising, falling, either) Patterns (Full Channel Width - AND: 0, 1, X) Stable (Full Channel Width) >, >=, <, <=, <> (Full Channel Width)						
Match Duration	Yes - 1 per match circuit - up to 1M samples each						
Trigger Pass Count	Yes (up to 1 Million per Sequencer stage)						
Trigger Output Sources	Seq 1, OR Seq 2, OR Seq 3, OR Seq4 OR (8 input sum-of-8 input products of all 8 match circuits)						

# Index

## - @ -

@ 113, 127, 139

## - [ -

[ 148

## - ] -

] 148

## - < -

< 148

## - > -

> 148

## - 1 -

1 148

## - 2 -

2 148  
2's Compliment 61

## - 3 -

3 148  
3D Satin Gradient 100

## - 4 -

4 148

## - 5 -

5 148

## - 6 -

6 148

## - A -

A 148  
Acquisition Options 29  
Active Marker 139  
Active Search 179  
Add Gutter Space for measurements 113  
Add Marker Time/Delta 161  
Add new Signal 7, 31  
Alignment Management 18  
Analog to Digital 33  
Analyzer Control and Status Message 7  
Analyzer Options 29, 88  
Analyzer Selection 23  
Analyzer State 119  
Appendicies 201  
Arbitrary Snap 127  
Arbitrary Snap to center 127  
Armed 119  
Associated Channels 31  
Asynchronous 33  
Asynchronous Signal 42  
Authenticode 3  
Auto Run 117  
Auto Save 20  
Auto Save/Restore 113  
Auto Search 97, 180  
automatic halt and transfer 117  
Auto-Snap 139  
Auto-Snap & Bring to Center 139

## - B -

Bandwidth shortage 123  
baud rate 42  
Bird's-Eye scrollbar 138  
bookmark 120, 127  
Boolean 33

- Boolean Signal 35
- Bottom Tool Bar 4, 8
- bounce noise 90
- Bring to Center 127, 139
- Buffer Settings 88
- Buffer Size 88
- Buffer Usage 119
- Bus 31, 33
- Bus Signal 37
- Bus Signal Format 127
- bus-powered 4
- bus-powered hub 3
- BUTTONS 14
- By Line Count 194

## - C -

- C 148
- Cable Connector Pinout 29
- CAN 2.0B 39
- CAN BUS 33
- CAN BUS Signal 39
- Cancel a connection 65
- capture buffer 88, 119, 120
- Capture Detail 194
- Capture History Buttons and Selection Bar 8
- Capture History ID 122
- Capture History Options 97
- Capture History Search 120
- Capture History Searching 182
- Captured Samples 122
- Capturing Data 7, 117
- Center indicator 139
- Center Line 113
- Center Time 135
- center time reference 127
- Changing the Signal Color 31
- Changing the Signal order 31
- channel indicator 90
- Channel Selection 35, 37, 42, 45, 51, 54
- circular queue 88, 117
- Clear 127, 139
- Clear All Button 187
- clear all markers 139
- Clear Data Before Run 113
- clear the buffer 119
- Click and drag to marquee 139
- Click-n-Drag 139

- CLK 51, 54
- Clock (SCL) 45
- Clock Channel 57
- Clock Edge 51, 54
- Close Button 186
- Collapse 127
- Color Selection 57
- Color Selection & Examples 35, 37, 42, 45, 51, 54
- Color Themes 29, 100
- color-coded 29
- Comments 194
- common ground 31
- communication errors 4
- Communication Settings 42, 54
- compression 187
- Configuration options 29
- Connecting Data Lines 29
- Connecting the Data Lines 29
- Controller Area Network protocol 39
- Convert Project 25
- Converting a Project 8
- Converting a Project for a New Analyzer 20
- create a new signal 31
- Create Project 21
- Create Signal 31
- Creating a New Project 23
- cross-linked 171
- CTRL Key 131, 138, 153
- Ctrl Key + Click 139
- Ctrl Key + Click-n-Drag 139
- Ctrl Key + Mouse Move 139
- Ctrl Key + Right-Click 139
- Cursor Keys 166
- Custom Baud 42
- Custom Color Themes 100

## - D -

- Data 51, 54
- Data (SDA) 45
- Data and Time of Capture 122
- Data Compression 187, 191
- Data Lines 29
- Data Selections 61
- Debug Plug-ins 113
- Decode 45
- Define Searches 172
- Defining Signals and Triggers 29, 31

- defining trigger conditions 29
- Delete a connection 65
- Delete a Signal 7
- Delete History 97
- Delete Signal 31
- Delete This Capture 120
- Deleting Signals 31
- DELTA mode 163
- De-Tabbing a window 12
- DigiView Compression 201
- DigiView Hardware Specifications 204
- Disable Signal Channels 42
- Display Behavior 97
- Display Gain 61
- Display Signals as a BUS 31
- Division Grid Snapping 153
- Do Not Change Position 97
- Do Not Save capture History 97
- Dock Sites 10
- Docking a Window 10
- Docking Override 10
- Drag & drop 127
- Drag Scrolling 131
- Drag to place 139
- dragging a marker 139
- Drop & Bring to Center 139
- Drop Marker 127
- Duration Units 172, 178
- Dusk 103

## - E -

- Edge Match 73
- Edge Snap 127
- Edge Snap to center 127
- Edge Snapping 131
- EDGE trigger 64
- Edit Search 179
- Edit Signal 127
- Edit Signal Properties 31, 127, 163, 166
- EITHER EDGE 64
- Enable 51, 54
- Enable Signal Channels 35, 37, 42, 45, 51, 54
- Enable State 51, 54
- Enabled Status 31
- Enforce Prefill 88
- Environment options 29, 113
- Equal Match 76

- Escape Key 21, 161
- Estimated Free Disk Space 186
- Example Project 21
- Expand 127
- Expand a signal 131
- Expand order 127, 163
- Expand, Edit and Change Signal Radix 131
- expanded channels 191
- Export 163, 166
- Export All 191
- Export Button 186
- export expanded channels 191
- export methods 186
- export the entire Capture History 186
- Export To 186
- Export+ 186
- Export++ 186
- Exported Data Example 187, 189, 191
- Exporting 186
- Exporting All Signal Data 187
- Exporting from List Windows 189
- Exporting from Table Windows 191
- external power supply 4

## - F -

- FALLING EDGE 64
- Field Idle Timeout 54, 57
- Field Length 54, 57
- Field Mode 173
- Field Separator 187, 189, 191
- Field SYNC 54
- Flamingo 103
- FLAT BUTTONS 14
- Flat Tile 100
- Floating a tabbed window 12
- Floating a Window 10
- Focus Example 4
- Font properties 4
- Frame Field Count 150
- Frame Idle Timeout 42, 51, 54, 57
- Frame Length 42, 54, 57
- Frame Mode 173
- Frame on 9bit Address flag 42
- Frame on SS 57
- Frame Period 150
- Frame SYNC 51, 54
- Frame SYNC Channel 51

Free Run/No trigger 64  
Free Scroll 127  
Frequency 150  
Full Buffer 119

## - G -

Glitch Filter 42  
Global Flag 139  
Global Marker menu 139  
Global Search 172, 178  
Gold 103  
Goto 130  
GOTO marker 139, 148  
Graphical Configuration 65  
Greater Than Match 80  
Greater Than or Equal Match 82  
Green 103  
ground 29  
ground wires 31  
Grouping 61  
Gutter Space 113

## - H -

H 148  
Halt 117  
Halt Analyzer 180  
Halt Options 180  
Halt Qualifier 180  
Halt when limitation reached 97  
Halted 119  
HALTING 117  
hardware based compression 201  
Hardware Buffer and Status 8  
Hardware Buffer Usage 119  
Hardware Status 119  
Hardware Triggers 31  
Hide Title Bar 113  
High Duty 150  
highest voltage 90  
History Browsing 120  
history buffer 120  
History Menu 120  
History Monitor 97  
History Searching 120  
Horizontal Lines 113

Hot Keys 148  
Hot-Keys 127

## - I -

I 148  
I2C 33  
I2C Signal 45, 166  
I2S 33  
I2S Signal 49  
IDLE 119  
Include I/O Direction 189  
Include Line Numbers 187, 191  
Include Packet Type 189  
Include Status 189  
Include Time Stamp 187, 189, 191  
independent scrolling 130  
Installing 3  
Installing the USB Drivers 3  
Instant Measurements 150  
Insufficient power 123  
Inter-IC Sound bus protocol 49  
interpolation 61  
Invert CLK/Data 51, 54  
Invert SDA/CLK 45  
Invert Signal Value 35, 37, 42  
Inverted Signal Display 31  
Invoking Searches 178

## - J -

JPEG 194  
Jump 127  
Jump to Marker 139  
Jump to Marker Pair 161  
Jump to markers 166

## - L -

Left/Right Click Example 4  
Left-Click 139  
Less Than Match 84  
Less Than or Equal Match 86  
LEVEL then EDGE trigger 64  
LEVEL trigger 64  
Lime 103  
Limit by Disk Free 97

- Limit by Number 97
- Limit by Size 97
- line numbers 187
- Link 127
- Link and Unlink Waveforms 7
- Link Group 163
- Link Group indicators 171
- Link groups 127, 171
- Linking Views into Time-Relative Groups 127
- List Exports 189
- List View Windows 166
- Load Last Project 21
- Local Menus 4
- Local Search 178
- Local Window Tool Bars 4
- Lock with Complement 139
- Low Duty 150
- lowest voltage 90
- LSB first 54
- Maximum Number of Captures to keep 97
- Measurement Features 150
- Measurements 127, 131
- Menus 4
- micro-grabber hooks 29
- Middle Mouse Button 153
- Middle Mouse Button Example 4
- Minimum Disk Size 97
- MISO Channel 57
- Monitor signals 117
- MOSI Channel 57
- Moss 103
- Mouse Basics 4
- Mouse Move 139
- Mouse Wheel 131, 166
- MSB First 42
- Multi-channel signals 163
- multiple channels 37
- multiple monitors 9

## - M -

- Main Menu 4, 7
- Manual Connections 65
- Mark the match point 172
- Marker brightness 100
- Marker Color Level 100
- marker color sets 100
- Marker Column 135, 139
- Marker Delta 113
- Marker Flag 139
- Marker Options 100
- Marker Selection 100
- Marker Snap Column 135
- Marker Tack 139
- Marker Text Level 100
- Markers 139
- Marquee to Zoom 127
- Marquee Zoom 127, 139
- Match 173
- match circuits 70
- Match Duration 178
- Match Pattern Format 172, 178
- Match Point 173
- match sequence 173
- Match Type 70
- Match Types 70
- Maximum Disk Size for Capture History 97

## - N -

- Navigate 131
- Navigating and Analyzing the Data 127
- Navigation Keys 148
- Navigation, Markers & Buttons 127
- Neon Blue 103
- Neon Green 103
- New List 166
- new position 31
- New Project 21, 23
- New Search Manager 179
- new signal 31
- New Table 163
- Next View 130
- no decoding 90
- Noise Filter 45
- Not Equal Match 78
- Notify when Save Needed 113
- Number Keys 148
- Numerical Format 187, 189, 191

## - O -

- O 148
- Open a Feature Window 7
- Open File 21

Orientation 194  
Overwrite when limitation reached 97

## - P -

P 148  
packet values 172  
Page 127  
Parity 42  
Parity/9bit Address flag 42  
Partial(P) Fields 57  
PAT 119  
PATTERN 64  
Pattern Match 72  
pattern matches 172  
Pattern Searches 173, 178  
Peach 103  
Period 150  
PFX 119  
PH 119  
physical channels 29, 31  
physical layout of the cable 29  
physical logic channels 33  
PINOUT 29  
Play Event Sounds 113  
Play Trigger Sound 113  
Plot and Skip sequences 61  
Plot configuration example 61  
Plot Example 61  
Plot Handle 131  
Plot Sequence Editor 61  
Plug-ins 113  
poor decoding 90  
positioning of windows 18  
Post Filling 119  
Post-Filling 119  
post-trigger data 88  
Power LED 123  
Powered 119  
POWERED HUB 3, 4  
Pre Filling 119  
Prefill 88  
pre-filling 117  
pre-trigger 88  
preview 117, 187  
Preview Size 194  
Previous View 130  
Print 127, 163, 166

Print Detail 194  
Print Preview 194  
Print Setup 194  
Printing 194  
Progress indicator 186  
Project Configuration Options 29  
Project Detail 194  
Project Selections 7, 20, 21, 113  
Project Settings 7, 31  
Project's assigned analyzer configuration 8

## - Q -

qualified trigger 64  
Qualifier 51  
Quick Measurements 153  
Quick Select Flags 139  
Quick Select Mouse and Key Functions 139

## - R -

R 148  
Radix 131  
real-time hardware based compression 201  
Recent Projects 21  
Reference Line for @ 113  
Re-Frame on BREAK 42  
rename the signal 31  
Required Disk Space 186  
Reserve Space 194  
Reset Colors 35, 37, 42, 45, 51, 54  
Reset Row Height 113  
Reset Row Heights 113  
Reset Signal Colors 100  
resistor color-code order 29  
resolution 163  
Restart Plot Sequence 61  
Restore Last File on Startup 113  
Restore last Project 20  
Right-Click 139  
RISING EDGE 64  
Run 117

## - S -

S 148  
sample rate 163

- Save as JPEG 127, 163, 166
- Save capture History 97
- Save Image 194
- Save Project 7
- Save Qualifier 180
- Save, No Save and Halt Options 180
- Saving a Project 20
- Saving the Project with a new name or to a different directory 20
- SCL 45
- screen area 138
- Scroll 127
- Scroll by 1 130
- Scroll by 5 130
- Scroll Start/End 130
- Scroll To 130
- Scroll to @ on Snap 139
- Scroll to Marker 97
- Scroll to Trigger 97
- Scroll-n-View 139
- SDA 45
- Search 130
- Search Button 178
- Search Description 172
- Search History 120
- Search Manager 7, 172, 179
- Search Manager Windows 179
- Search Manger Searches 178
- Search Marker 172
- Search Name 172
- Search Types 173
- Searches 172
- Searching 178
- Searching Capture History 182
- Searching the Data 127
- Select All Button 187
- Select Data Slice 61
- Selected Colors 100
- Selections on Startup 113
- Send to Printer 194
- sequence specifiers 61
- Sequencer 69
- sequencer counter 69
- Sequential Field search 172
- Sequential Frame search 172
- Sequential search 173
- Sequential Searches 173
- serial packets 42
- serial protocol 45
- Set 127
- SET marker 148
- Setting a Sequencer Counter 69
- Setting the Match Type 70
- Show Field Idles 42, 51
- Show Field Names 166
- Show Frame Idles 42, 51
- Show Frames 166
- Show Selections on Startup 113
- Show Time Column 166
- Sign & Magnitude 61
- Signal 33
- Signal Colors and Type 31
- Signal Definitions 31
- Signal Disable 31
- Signal Edge Snapping 153
- signal editor 31
- Signal Editors 33
- Signal Name 31, 35, 37, 42, 45, 51, 54, 57
- signal options 31
- Signal Properties 127
- Signal Radix 131
- Signal Row Order 127
- Signal Selection 187, 191
- signal type 31
- Signal Types 33
- Signal Value Column 135
- Signals 31
- Signal's Menu 131
- Silver 103
- Single or Split Waveform View 7
- Skip 173
- Skip Bits 54, 57
- Skip Count 173
- Slate 103
- Snap 127
- snap indicator 139
- SNAP LEFT 139
- Snap Marker buttons 139
- Snap Markers 127
- SNAP NEAREST 139
- SNAP RIGHT 139
- Snap Signal 127
- Snap Signal Column 135, 139
- Snap to Frames 113
- Snapping 139
- Space Bar 131

SPI 33  
SPI Signal 57  
Split 139  
square post connectors 29  
SS Channel 57  
Stable Match 75  
Standard-Mode I2C bus 45  
Start a connection 65  
Starting with a new Project 20  
State 33  
state clock 51  
State Signal 51  
static protection 29  
Status LEDs 119  
Steel Blue 103  
Stop 117  
Stop Button 186  
STOPPING 117  
storage devices 186  
STRETCH to FIT 14  
Subject 194  
symbolic names 31  
Sync (skip transitions) 42  
Sync Start of Packet 42, 54  
Synchronized Scrolling 130  
Synchronous 33  
Synchronous Scrolling 127, 171  
Synchronous Signal 54

## - T -

T 148  
Tab Orientation 14  
Tab Rows 14  
Tab Size 14  
Tab Style 14  
Tab Window Options 12, 14  
Tabbing windows 12  
Table Exports 191  
Table View Windows 163  
Tabular Views 127  
Theme Examples 103  
Theme Selection 100  
Threshold settings 90  
threshold value 90  
Time Column 163, 166  
Time Display 163, 166  
time divisions 138

time format 163, 166, 187  
Time per Division 131  
Time Range 186  
Time Reference 135  
Time Reference point 135  
Time Source button 135  
Time Synchronized 163, 166  
timeout period 117  
Time-Relative Columns 127  
Time-Relative Groups 127  
Timestamp 187, 191  
Toggle Frames 166  
toggle Instant Measurements 130, 150  
Toggle Names 166  
Toggle Time 166  
Tool Bar 4  
Tool Bar visibility 4  
Toolbar Buttons 130  
Top Tool Bar 4, 7  
Total Timespan 122  
Transferring 119  
Transition voltage 90  
Trigger condition 117  
Trigger Configuration 65  
Trigger Configuration Selection 65  
trigger criteria 64  
trigger event 88  
Trigger Formula 65  
trigger immediately 64  
Trigger Threshold 90  
Trigger Voltage 90  
Triggered 119  
Triggers 31, 64  
Troubleshooting 123  
Truncated fields 45  
Turquoise 103

## - U -

Understanding DigiView Compression 201  
Undock 12  
Undock a Window 10  
Unsigned 61  
USB cable 4  
USB Connection 4, 29  
USB Drivers 3  
Use Project Location 194  
user preferences 29

Using Link Groups 171  
Using Markers 127, 139  
Using the same channels in multiple definitions 33

## - V -

Vertical Lines 113  
Vertical Position 61  
Viewing the Data as Graphical Waveforms 127  
Viewing the Data in Time-Relative Columns 127  
Violet 103  
voltage range 90  
Voltage Threshold 90  
Voltage Thresholds 88

## - W -

waiting for Trigger 119  
Wave Form Views 113  
Waveform Association 139  
Waveform Menus 127  
Waveform View 130  
Waveform Views 127  
Where to begin Searching 172  
Window Appearance 100  
Window Arrangement 9  
Window Background 100  
Word Wrap Output 194

## - Z -

Z 148  
Zero Offset 61  
zoom 127, 131, 148  
Zoom and Scroll 161  
Zoom In 130  
Zoom In Max 130  
Zoom Max 127  
Zoom Min 127  
Zoom Out 130  
Zoom Out Max 130  
Zoom to Split Pair 139



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